

CONNECTICUT RIVER FLOOD CONTROL

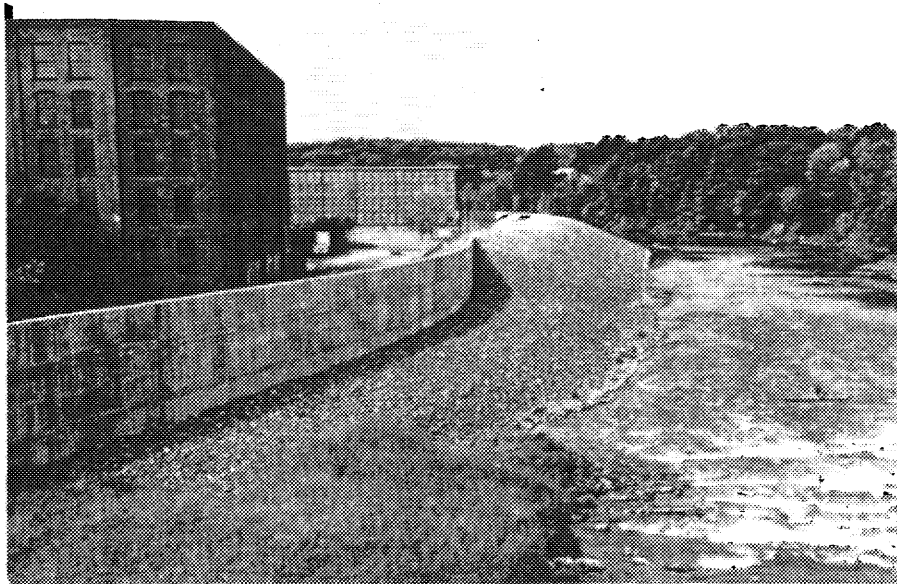
# OPERATION AND MAINTENANCE MANUAL

FOR

FLOOD PROTECTION WORKS

CHICOPEE FALLS, MASSACHUSETTS

CHICOPEE RIVER



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS.  
JANUARY 1968

OPERATION AND MAINTENANCE MANUAL  
FOR  
FLOOD PROTECTIVE WORKS  
ON  
CHICOPEE RIVER  
AT  
CHICOPEE FALLS, MASSACHUSETTS

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424 Trapelo Road  
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FOREWORD

The successful functioning of the Chicopee Falls flood protective works is not assured solely by construction of a system of dikes, floodwalls, floodgates, pumping stations, and other appurtenant structures. If the system is to perform the functions for which it was designed, it must be carefully maintained during periods of normal river stages and properly operated during flood periods.

The need for proper maintenance cannot be too highly stressed in view of the fact that large damages may be incurred through operating failure of a critical element in flood time, caused by deterioration or damage that would have been eliminated by proper maintenance.

Necessary maintenance and proper operation require that responsible local persons have a thorough understanding of the functions of the various units of the system and the recommended methods of maintaining the system and operating it during flood emergencies. It is the purpose of this manual to provide complete information so that all parties may fully understand their responsibilities in maintaining and operating the flood protection system in accordance with the regulations prescribed by the Secretary of the Army as amplified by this manual.

The general flood control Regulations for Maintenance and Operation of Flood Control Works quoted herein were approved by the Acting Secretary of War on 9 August 1944. Upon establishment of the Department of Defense, the improvement of rivers and harbors and other waterways for flood control and other purposes, formerly under the jurisdiction of the Secretary of War, became the responsibility of the Secretary of the Army. Reference therein to the Secretary of War and War Department shall be construed to mean, respectively, the Secretary of the Army and the Department of the Army. Where reference is made to the District Engineer in the Regulations included in this manual, it shall be construed to mean the Division Engineer, New England Division, Corps of Engineers.

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at

CHICOPEE FALLS, MASSACHUSETTS

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## A. GENERAL

1. PURPOSE OF THIS MANUAL. Included in the authorization of the project are conditions specified by the Secretary of War to be met by local interests. One of these conditions is the Operation and Maintenance of the project after its completion. Under Assurances, dated 14 February 1963, furnished to the Government by the Commonwealth of Massachusetts, the Commonwealth has agreed to meet these conditions, and in particular, the operation and maintenance of the project after its completion. It is understood that the Commonwealth has obtained similar assurances from the City of Chicopee which will assume certain of the responsibilities for the operation and maintenance. However, since the Assurances furnished the Government are from the Commonwealth, this manual recognizes only the Commonwealth as responsible for the required operation and maintenance. A copy of the above assurances is included in Appendix "B" of this Manual.

The purpose of this Manual is to present detailed information to be used as a guide in complying with "Flood Control Regulations - Maintenance and Operation of Flood Control Works" as approved by the Acting Secretary of War on 9 August 1944, and published in this volume as Appendix A.

The regulations are intended to cover all local protection projects constructed by the Department of the Army throughout the United States, are general in nature, and obviously cannot give detailed instructions for the maintenance and operation of a specific project. The details set forth in this Manual for maintenance and operation of the Chicopee Falls project are intended to supplement the Regulations to insure the maximum protection against floods for which the project was designed. Failure to maintain and operate the project as required by the Regulations and as detailed herein can result in severe property losses, loss of life, and irreparable loss of confidence in the flood protection system by citizens who have invested their funds on the basis of the protection afforded by the flood control works.

2. PROJECT AUTHORIZATION. - The Chicopee Falls Local Protection project was authorized by the Flood Control Act of 14 July 1960 (Public Law 86-645, 86th Congress, 2d Session) in accordance with recommendations of the Chief of Engineers set forth in House Document No. 434, 86th Congress, 2d Session.

3. PROJECT LOCATION. - The project is located on the Chicopee River in the City of Chicopee, Hampden County, Massachusetts. The Chicopee River joins the Connecticut about two miles west of the project. The

local protection project extends from the Deady Memorial Bridge westerly to a point downstream of the United States Rubber Company plant. Along the left bank, the project protects a highly industrialized flood plain, including, from the Deady Bridge, buildings formerly occupied by the Savage Arms Corporation, the plants of the Chicopee Manufacturing Corporation, and the United States Rubber Company. The right bank is high with no improvements near the river.

4. DESCRIPTION OF PROJECT. - The project consists of earth dikes and concrete floodwalls; channel improvement and excavation on the right bank; pressure conduits to intercept surface drainage from the area above the industries; and two pumping stations.

5. EFFECTIVENESS OF PROTECTION. - The project is designed for a discharge of 70,000 cfs as modified by the existing Barre Falls and Conant Brook Reservoirs. This flow was produced by a design storm assumed to be centered on a divide between the Ware and Quaboag Rivers which resulted in the most critical conditions on the Chicopee River. The design discharge exceeds the 42,500 cfs experienced during the record flood of September 1938 at the Indian Orchard USGS gaging station. The tops of the dikes and floodwalls provide a 3-foot freeboard above the stages of the design discharge.

6. CONSTRUCTION HISTORY. - The construction of the Chicopee Falls Local Protection Project was accomplished under one construction contract awarded in the amount of \$2,132,865 to Daniel O'Connell's Sons, Inc., Holyoke, Massachusetts. Construction was started early in October 1963 and the project was placed in service in July 1965.

The combined total cost of the project is estimated at \$2,655,000. The Commonwealth of Massachusetts expended an estimated \$475,000 for the local interest costs. The Federal cost of the project is estimated at \$2,180,000.

7. PLANS. - Plans pertinent to the operation and maintenance of the project are included for reference as Appendix E in this volume. A set of "as-built" construction drawings is being provided the City of Chicopee.

8. LOCAL COOPERATION. - The authorizing legislation for the Chicopee Falls Local Protection project was the Flood Control Act of 14 July 1960 (Public Law 86-645, 86th Congress, 2d Session) and reads as follows:

"The plan for flood protection on the Chicopee River, Massachusetts, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document

Numbered 434, Eighty-sixth Congress, at an estimated cost of \$5,180,000. No obligation shall be incurred for the cost of this project where the flood control benefits are exclusively for local flood control, as determined by the Secretary of the Army (except costs of planning, design, and acquisition of water rights), unless the State or one or more other non-Federal entities shall have entered into an agreement in advance to assume at least 20 per centum of the cost (except costs of planning, design, and acquisition of water rights) of the completed project allocated to the production of local flood control benefits, payable either as construction proceeds or pursuant to a contract providing for repayment with interest within 50 years. The actual cost, or fair market value of lands, easements, rights-of-way, and work performed or services rendered prior to completion of construction of the project, which are furnished by a non-Federal entity, shall be included in the share of the cost to be borne by the non-Federal entity."

In House Document Numbered 434, 86th Congress, 2nd Session, the Chief of Engineers recommended that, prior to construction, local interests give assurances satisfactory to the Secretary of the Army that they will:

"(a) Provide without cost to the United States all lands, easements, and rights-of-way necessary for the construction of the project;

"(b) Make necessary alterations to roads, sewers, and utilities, including alterations to the water intake facilities of the United States Rubber Company and provisions for temporary water supply during construction of the project;

"(c) Hold and save the United States free from damages due to the construction works;

"(d) Permit no encroachment on improved channels or on ponding areas, and if ponding areas or capacities are impaired, provide substitute storage capacity or equivalent pumping capacity promptly without cost to the United States; and

"(e) Maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of the Army."

The assurances of the Commonwealth of Massachusetts are contained in Appendix B of this volume. This Manual is to assist the Commonwealth and the City of Chicopee in fulfilling (e) above of their responsibilities for maintaining and operating the project.

9. GENERAL RULES AND REGULATIONS. - Paragraph 208.10 (a) of the regulations prescribed by the Secretary of War gives general rules for the maintenance and operation of structures and facilities constructed by the United States for local flood protection. Applicable portions are quoted below to avoid the necessity for cross reference and are further defined by remarks under each quotation.

"(1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits."

These requirements cannot be overstressed, and City authorities must make adequate provisions for funds, personnel, equipment, and materials to allow for the proper maintenance and operation of the flood protective works.

"(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the 'Superintendent', who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during the periods of low water, all without cost to the United States."

The committee should be composed of competent members, preferably men experienced in engineering or construction work of a nature similar to the flood protection works. The committee must

be given broad authority to carry out its responsibilities. The name, address, and office and home telephone numbers of the Superintendent, and any changes thereof, shall be promptly furnished the Division Engineer.

"(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times."

Approximately 2500 sand bags and canvas or sisal-craft paper and tools such as picks and shovels and 5 men should be obtained and held in reserve to meet any ordinary emergency that may occur during flood periods. Borrow pits for embankment materials should be secured and sources or where to obtain additional supplies of materials, tools, and equipment should be well established in order that these articles can be obtained quickly in case of an emergency.

"(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the rights-of-way for the protective facilities."

The disposal of rubbish, erection of fences, or barriers, the painting or erection of signs, the attachment of clothes lines to flood walls, or any form of trespassing on the project shall be prohibited.

"(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the War Department or his authorized representatives that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work."

Any contemplated improvements or alterations as outlined above must be submitted to the Corps of Engineers, Waltham, Massachusetts, and the approval of the Division Engineer obtained prior to the City authorizing the work. All requests for approval shall be in writing and complete drawings in duplicate, one set of which shall be in reproducible form, must be submitted along with a full description of the work intended. The City will be held responsible for obtaining prior approval from the Corps of Engineers for any improvements or alterations proposed by itself, private parties or any public parties. The City shall furnish the Division Engineer as-built drawings, in duplicate, of the completed work.

"(6) It shall be the duty of the Superintendent to submit a semi-annual report to the District Engineer covering inspection, maintenance, and operation of the protective works."

See Paragraph 12 of this Manual for instructions on submitting reports.

"(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works."

The Division Engineer or his representatives will make periodic inspections of the protective works to determine if the project is being properly maintained and operated by the City.

"(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made."

The City should maintain the facilities and keep them in good repair and not wait for the Division Engineer to call such matters to its attention. Upon request, the Division Office will advise the City how to make any major repairs to the facilities.

"(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods."

The City should formulate plans and negotiate agreements with local organizations and companies, who are operating facilities connected with the protective works, to insure that their activities will be properly coordinated with the Superintendent's organization during flood periods.



"(10) The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations."

The flood control committee should familiarize itself with the contents of this manual. The City authorities are encouraged to call on the Division Office of the Corps of Engineers for any additional advice or instructions required by them in carrying out the City's obligations for maintaining and operating the flood protection facilities.

10. MAINTENANCE. - a. The word "maintenance" as used in this manual applies to the upkeep, repair and care of the work constructed by the United States and turned over to the Commonwealth and the City of Chicopee. If the work is neglected there will be deterioration and possible failure in flood time when there is dire need of dependable protection.

b. Satisfactory and dependable operation depends on constant maintenance. The organization that performs maintenance must be familiar with various parts of the system and will be in a position to use them effectively in time of stress.

c. Maintenance includes regular inspection of the entire system. The purpose of an inspection is to detect any deterioration or faulty operation that indicates a need for repair or replacement. This does not mean a casual automobile trip to places easily accessible but actually walking over every part of the system.

d. In addition to inspection, gates and pumping station equipment require testing at stated intervals to discover the difficulties that may develop or the part that will not work when it should.

e. Each of the major features of the project is discussed separately. Particular emphasis is placed on those points which, based on experience with special project features, require special attention.

11. OPERATION. - a. Operation in this manual refers to the actual use of the various features of the protection works during flood periods. It is intended that the procedure outlined herein will be sufficient to insure protection from floods to the design stage. However, advice relative to operation may be obtained at any time from the Engineering Division of the New England Division Office.

b. When abnormal river flows and stages are expected it is important that the Superintendent make immediate decisions and take prompt action and that he have the authority to carry out his decisions.

c. To insure correct operation it is essential that at least one person (preferably 2 or 3) (1) be familiar with all phases of the flood protection works, (2) know when to start the pumping stations, (3) know the location of gates and valves and when to close them, (4) know just what supplies and transport are on hand, and (5) know what men and tools can be mobilized for the patrolling and repair work.

d. Arrangements should be made with the U.S. Department of Commerce, Environmental Sciences Services Administration, 135 High Street, Hartford, Connecticut 06101 (telephone number 203-244-2014), to keep the City informed on flood predictions. The ESSA Weather Bureau maintains the River Forecast Center at Hartford and is the official agency for collecting precipitation and runoff data. Personnel at the Center prepare flood forecasts and are responsible for issuance of flood warnings in the Chicopee River basin.

e. It will be to the advantage of the City to negotiate agreements with private owners and companies to operate and maintain project features that are directly related to facilities and property of those parties. However, the Corps of Engineers will look to the Commonwealth and the City for maintenance and operation of the project since the Commonwealth executed assurances of local cooperation.

12. INSPECTION AND REPORTS. - The regulations prescribed by the Secretary of the Army call for semi-annual reports to be submitted by the Superintendent to the Division Engineer, covering inspection, maintenance and operation. Inspection of the flood protective facilities shall be made immediately prior to flood seasons, immediately following floods, and otherwise at intervals not exceeding 90 days as required by the regulations.

To assist the Superintendent in making his inspections and reports, sample forms have been prepared and are included in Appendix C. The Superintendent shall have additional copies printed for use in submitting his reports.

The semi-annual reports shall be submitted in triplicate to the Division Engineer each February and August. The reports will be submitted in letter form with copies of the inspection forms covering the inspections made during the period of the report. The reports shall cover the following points:

- a. A description of the maintenance work performed in the preceding six months.
- b. The number and classification of men working on maintenance, regularly and intermittently.
- c. Description of any work performed by contract on the repair or improvement of the project.
- d. Description of use or operation of the system during the period being reported.
- e. Suggestions relative to public cooperation and comments concerning public sentiment on the protection obtained are considered pertinent and desirable data for inclusion in the report, but such data are not required.

In addition to the maintenance reports discussed above, monthly reports of operations will be submitted to the Division Engineer. The purpose of the monthly reports is to maintain an up-to-date record of project operations, so that prescribed regulation procedures may be analyzed and modified, where necessary, as actual regulation experience indicates. These reports should include gage readings, gate settings, pumping data and other pertinent information.

## B. CHANNEL IMPROVEMENT

13. DESCRIPTION. - The channel improvement covers the widening, deepening and straightening of the channel of the Chicopee River. The channel is trapezoidal in section with 1 on 2.5 side slopes and various bottom widths.

14. MAINTENANCE. - Paragraph 208.10 (g) (1) of the prescribed regulations sets forth rules for the maintenance of channels and floodways. These rules are quoted below, followed by brief comments on the particular applicability of these rules to the Chicopee Falls project.

"Channels and floodways. - (1) Maintenance. - Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

"(i) The channel or floodway is clear of debris, weeds, and wild growth."

All debris and growth which tend to restrict the channel shall be removed promptly.

"(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments."

Dumping of waste materials or any types of encroachment on the channel shall be prohibited and prompt steps shall be taken to remove or have removed any such encroachments.

"(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals."

Shoal areas should be removed but care should be exercised that slopes of the channel and existing banks are not undercut. Existence of shoal areas will be apparent from inspections during time of low flow.

"(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred."

Banks damaged by rain or wave wash or sloughing shall be repaired promptly, using bankrun gravel and rock similar to that used in their original construction.

"(v) Riprap sections and deflection dikes and walls are in good condition."

Rockfill slope protection must be maintained in good condition to resist erosion. Any loss of rock due to slides, erosion or vandalism must be promptly replaced. Periodic checks should be made of the stone slope protection for possible movement or loss of stone, and prompt corrective action taken. The rock toes should be observed closely for stability.

"(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works."

In order for this project to function properly and as designed, the channel of the Chicopee River downstream from the project must be maintained in such condition that it is capable of carrying flood flows and not cause the river to back up, thus nullifying the effect of the improved channel.

"Such inspection shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary."

15. OPERATION. - Paragraph 208.10 (g) (2) of the prescribed regulations gives rules for operation of channels and floodways. These rules which are quoted below are self-explanatory and require no amplification with regard to the **Chicopee Falls project.**

"(2) Operation. - Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired."

Rules and instructions for emergency repairs measures for the dikes as given in Paragraph 19 are equally applicable to emergency repairs of the channel.

### C. DIKES

16. DESCRIPTION. - There are two dikes in the project. The upstream dike is 740 feet long and the downstream dike is 2,880 feet in length. These dikes consist of compacted random fill with compacted impervious blankets on the river side. They have a maximum height of 28 feet (taken at the centerline) and 31 feet (taken at the river side slope).

The land side slopes are 1 on 2. They and the tops of the dikes are protected by turf against erosion. The turf was produced by seeding a 6-inch layer of topsoil.

The river side slopes are 1 on 2.5. They are protected by an 18-inch layer of stone slope protection material placed on a 12-inch minimum thickness gravel bedding layer.

17. MAINTENANCE. - Paragraph 208.10 (b) (1) of the prescribed regulations sets forth rules for the maintenance of levees. These rules apply equally to earth dikes, and applicable portions are quoted below. Following this, points that apply particularly to the **Chicopee Falls** project are discussed.

"Levees. - (1) Maintenance. - The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, to exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable

growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

"(i) No unusual settlement, sloughing or material loss of grade or levee cross section has taken place;

"(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section,

"(iii) No seepage, saturated areas, or sand boils are occurring;

"(iv) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

"(v) Drains through the levees and gates on said drains are in good working condition;

"(vi) No revetment work or riprap has been displaced, washed out or removed;

"(vii) No action is being taken, such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod;

"(viii) Access roads to and on the levee are being properly maintained;

"(ix) -----Not applicable-----.

"(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;

"(xi) There is no unauthorized grazing or vehicular traffic on the levees;

"(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during time of emergency.

"Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days; and such intermediate times as may be necessary to insure the best possible care of the levee. Immediate steps will be taken to correct



dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent."

Any unusual settlement, sloughing or caving should be corrected to restore the original dike grades. No major repair work shall be made without prior approval of the Division Engineer, in order that such repairs that may be necessary will not adversely affect the functioning of the protective facilities.

The landside slopes of dikes and the tops of the dikes were topsoiled and seeded to minimize the damage from erosion and scour caused by surface runoff. Once established, the vegetation shall be mowed at regular intervals.

When sections of the dike require reestablishment of turf, seeding operations should be started at the earliest practical date in the spring to secure the greatest possible protection against erosion. Areas requiring seeding shall be dressed to fill gullies and irregularities in the surface. The following seed mixtures were used in the original construction:

TABLE I

GRASS SEED

<u>Kind of Seed</u>	<u>% of Wt. In Mixture</u>	<u>Min. % Purity</u>	<u>Min. % Germ.</u>
(Botanical Name)			
(Common Name)			
<i>Agrostis tenuis</i> hv			
Highland Bentgrass	5	98	85
<i>Bromus inermis</i>			
Smooth Brome	10	85	90
<i>Festuca elatior</i>			
Alta Fescue	30	98	85
<i>Festuca rubra</i>			
Red Fescue	35	98	85
<i>Poa compressa</i>			
Canada Bluegrass	15	80	75
<i>Trifolium repens</i>			
White Clover (New York Wild Strain)	5	98	85

Note: Weed seed not to exceed 1.0% of total mixture.

Inspections of the dike shall be made during and after periods of high water, as it is at such times that any weak spots will be discovered that might otherwise be overlooked.

18. OPERATION. - Paragraph 208.10 (b) (2) of the prescribed regulations sets forth rules for the operation of levees. These rules apply equally to earth dikes and are quoted below. Following these, a few of the points which apply particularly to the Chicopee Falls project will be discussed.

"(2) Operation. During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

"(i) There are no indications of slides or sloughs developing;

"(ii) Wave wash or scouring action is not occurring;

"(iii) No low reaches of levee exist which may be overtopped;

"(iv) No other conditions exist which might endanger the structure.

"Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section."

Operation of the dikes may be at a time of moderately high water, such as a spring freshet, or may be when unusual conditions indicate the possibility of dangerous flood heights. Prompt action in starting work is of the utmost importance.

Requirements for patrolling the dikes depend on the depth of water on the river side of dike. Patrolling of the dikes should start when the water surfaces of the rivers reach the same elevation as the surface of the ground on the land side of the dikes and floodwalls. The patrolling should continue until the flood has reached its peak and receded below the elevation of the land side ground.

The water level in observation risers shall be recorded at least twice daily to determine proper functioning of the toe drains whenever the rivers rise 5 feet above the elevation of the surface of the ground on the land side of the dikes and floodwalls.

Patrolmen should be thoroughly instructed as to their duties, what they are to watch for, and the exact limits of their beat. On each journey of inspection they should carefully examine both slopes of the dikes for seepage or wetness on landside slope, sand boils on landside of dike, wave wash or scouring on riverside slope, and indications of slides or sloughs on either slope.

All unauthorized traffic on the dikes should be stopped at once, and patrolmen should be instructed to keep people off the dike unless they can show passes or credentials authorizing their presence.

19. EMERGENCY REPAIR MEASURES. - Scours. - Careful watch should be maintained of the dike for indication of scouring. If any indication of scouring is observed, soundings should be taken to observe the amount and progress of the scour. Sandbagging or dumped rock will generally afford the most practicable means of combatting this condition. The open ends of sandbags so used must be sewed or tied after filling with earth.

Wave wash. - Wave action may cause displacement of riprap and wash-out of earth materials on the riverside slope of the dike. Well-sodded slopes will usually withstand waves from a storm of about an hour's duration without serious damage. An attack over a longer period may become serious and the slopes should be protected by sacking or equivalent means. The extent of washes can be determined by wading along the attacked slope. Sandbags should be placed in the erosions in as effective a manner as possible, carrying the protection well above the action of waves. Sandbags used for this purpose require only about one-half cubic foot of material and should be sewed or tied. The aim is to obtain a maximum of coverage with only sufficient weight to hold the sack in place.

Sand Boils. - a. General. - A sand boil is the result of a transfer of pressure head and seepage from the river, through a pervious stratum near or at the surface, to the landside of the dike.

This seepage under pressure tends to push its way to the surface and actually floats the material through which it flows. No harmful effect results provided the weight of the relatively impervious soil layer overlying the pervious stratum, in which the flow under pressure is occurring, is sufficient to counterbalance this pressure. When the soil stratum overlying the pervious layer is insufficient to counterbalance the upward pressure or when no such stratum exists, boils break through the surface on the landside wherever these weaknesses are present. The sand boil may discharge relatively clear water or the discharge may contain quantities of sand and silt, depending upon the magnitude of the pressure and the size of the boil.

b. Effects of Sand Boils. - Sand boils can produce three distinctly different effects on the levee, depending upon the condition of flow under the levee. These three effects are illustrated in Appendix D. In Figure 1, Plate No. I, the seepage flow develops a definite pipe or tube under the levee. This breaks out at the landside toe in the form of one or more large sand boils. Unless checked, this flow causes a cavern to be developed under the levee, resulting in subsidence of the levee and subsequent overtopping. This case can be most easily recognized by slumping of the levee crown. Figure 2, Plate No. I, illustrates the case where seepage flows under pressure under the levee without following a defined path, as the case above. This flow results in one or more boils outcropping at or near the landside toe. The flow from these boils tends to undercut and ravel the slope, resulting in a sloughing of the slope. Evidence of this type of failure is found in undercutting and ravelling at the landside toe. Figure 3, Plate No. I, shows a third type of effect of a sand boil. In this case, numerous small boils, many of which are scarcely noticeable, outcrop at or near the toe. While no boil may appear to be dangerous in itself, the consequence of the group of boils is to cause flotation of the soil, thereby reducing the shearing strength of the material at the toe, where maximum shearing stress occurs, to such an extent that failure of the slope through sliding results.

c. General Instructions for Handling Sand Boils. - All sand boils shall be watched closely. A sand boil which discharges clear water in a steady flow is usually not dangerous to the safety of the dike. However, if the flow of water increases and the sand boil begins to discharge material, corrective action shall be taken immediately.

d. Method of Treatment. -

(1) The accepted method of treating sand boils is to construct a ring of sandbags around the boil, building up a head of

water within the ring sufficient to prevent further movement of sand and silt. The accepted method of ringing a sand boil, shown on Plate No. II of Appendix D, is as follows:

(a) The entire base of the sack ring is cleared of debris, in order to provide a watertight bond between the natural ground and the sack ring.

(b) The sacks are then laid in a ring around the boil, with joints staggered, and with loose earth between all sacks.

(c) The ring is carried only to a height sufficient to prevent material from being discharged. The ring should not entirely stop the flow of water, because of the probability of the excessive local pressure head causing additional ruptures of imperious strata and boils nearby.

(d) A "V" shaped drain constructed of two boards, or a piece of sheet metal, is then placed near the top of the ring to carry off water.

(2) Actual conditions at each sand boil will determine the exact dimensions of the ring. The diameter and height of the ring depend upon the size of the boil, and the flow of water from it. In general, the following considerations should govern:

(a) The base width should be no less than  $1\frac{1}{2}$  times the contemplated height.

(b) It is well to include weak ground near the boil within the ring, thereby preventing a break-through later.

(c) The ring should be of sufficient size to permit sacking operations to keep ahead of the flow of water.

(3) Where many boils are found to exist in a given area, a ring levee of sand bags shall be constructed around the entire area and, if necessary, water pumped into the area to provide sufficient weight to counterbalance the upward pressure.

Sloughs. - During prolonged high water stages, seeping and sloughing conditions on the landside slopes may occur. Such conditions should be observed closely as to progress of seepage up the landside slope and the amount of material that is being carried by seepage. If the seep velocity becomes great enough to cause, or probably cause, erosion or sloughing of the slope, a sandbag covering should be placed on the seeping area, beginning well out from the toe and progressing up the slope. The covering should extend several feet beyond the saturated area. If the material is obtainable,

the affected area should be covered with brush, straw or similar permeable material to a depth of two to four inches before placing the sandbag cover. This will permit the seep water to get away while serving as a filter to prevent loss of earth from the dike. After the covering is placed, close observation should be maintained and additional layers of sandbags placed on the previous ones until the velocity of the seepage is reduced to a point at which the amount of material carried is negligible. Sacking sloughs are illustrated on Plate No. III of Appendix D.

Raising existing earth dikes. - In an emergency, time and other conditions permitting, the grade of a dike can be safely raised three feet. The methods most commonly used for this purpose are outlined in the following paragraphs.

a. Sandbag topping. - The sack ordinarily used for topping an earth dike is a grain or feed sack which holds 100 pounds of grain. Smaller sacks may be used if feed sacks are not available. Grain sacks, filled with about one cubic foot of earth, weighing about 100 pounds, will provide a unit about six inches high, one foot wide and two feet in length.

The sacks may be filled at the source of material and hauled to the dike or filled from stockpile or borrow areas at the dike; conditions determining the method employed. The same is true of filling; i.e., whether power or hand methods are used.

The open end of the sacks should always face upstream or toward the riverside of the dike and need not be sewed or tied. When the sack faces the river the loose end should be folded under and when facing upstream the loose end covered by the succeeding sack.

The front line of sandbags in the first layer should be laid parallel to the dike center line and remaining bags at right angles to the center line. The sandbags in the second layer are all laid at right angles to the center line, the third row similar to the first, etc., as shown on Plate No. IV, Appendix D. All sacks should be lapped about 1/3 each way and well mauled or tramped into place. The sacks should be filled to 2/3 their capacity when flattened out to facilitate proper placing and prevent bursting the sack when mauled or tramped into place.

Plate No. IV illustrates the progressive method of increasing the dike height and gives an approximation of the number of sacks required for dikes of various heights. Plate No. V shows pictures of model sack dike or topping.

A crew of 50 men should fill, carry and place approximately 1500 sacks per eight-hour day, all hand labor, when the source of material is within 150 feet of the point of placement. Production will depend on conditions at the site.

b. Lumber and Sandbag Topping is the most satisfactory method of raising low reaches of earth dike in emergencies. The chief objection is the time required to install. In putting on this topping, as well as any other topping, a careful line of levels should be run and grade stakes set in advance unless the dike top follows a dependable grade-line. Two-by-four or two-by-six inch stakes should then be driven on the riverside of the crown six feet apart and one-by-twelve inch boards nailed to landside of the stakes. This wall, backed with a single tier of sandbags, will hold out at least one foot of water. If the second foot is necessary, the layers of bags will have to be increased in number and reinforced. Sandbags are laid substantially in the manner described in a. above. The stakes should be driven at least three feet into the ground, leaving at least three feet out, which will, in extreme cases, hold a three-foot topping if properly braced behind the sandbags. Plate No. VI, Appendix D illustrates this method of raising a dike.

#### D. FLOODWALLS

20. DESCRIPTION. The floodwalls are of the "T" type of reinforced concrete construction with waterstops at expansion joints. Only the upper parts of the walls are visible since the earth on both sides of the walls has been backfilled and compacted. The channel side slopes and the stone protection about the river side of the wall.

The upstream floodwall is 557 feet long and downstream floodwall is 863 feet in length. The maximum height of the floodwalls is approximately 39 feet, including the embedded base slabs.

21. MAINTENANCE. - Paragraph 208.10 (c) (1) of the prescribed regulations sets forth rules for the maintenance of floodwalls. Applicable portions of these rules are quoted below.

"Periodic inspections shall be made by the Superintendent to be certain that:

"(i) No seepage, saturated areas, or sand boils are occurring;

"(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

"(iii) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

"(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

"(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

"(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;



"(vii) No bank caving conditions exist riverward of the wall which might endanger its stability;

"(viii) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.

"Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice."

22. OPERATION. - Paragraph 208.10 (c) (2) of the prescribed regulations gives rules pertaining to floodwalls during periods of flood emergency. These rules are quoted below.

"Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall."

23. EMERGENCY REPAIR MEASURES. - The Superintendent or responsible members of his organization shall take immediate action to correct any condition which endangers the stability of the wall. All such measures taken will be reported to the Division Engineer immediately after the flood period.

Sand Boils. - See Paragraph 19 for emergency measures to be taken in the event sand boils develop.

Monolith Joints. - Appreciable leakage through vertical monolith joints can be controlled by dumping cinders, sawdust, or similar material on the riverside of the wall. The dumped material will be carried into the joint by the water and plug the leak.

Raising Grade of Wall. - In an emergency, the walls may be raised temporarily by a single row of sandbags or by erecting wooden flashboards similar to those shown in Plate VII of Appendix D. Construction of the wooden extensions would require minor modification to fit the **Chicopee Falls floodwall.**

## E. UTILITIES

24. DESCRIPTION. - Water, sewer and storm drains that pass under the protection and channel are shown on utility sheets included in Appendix E of this Manual. The water, sewer and drainage structures connected with the project are outlined in Table II. They are discussed in more detail hereafter.

25. MAINTENANCE. - The utilities passing through the protection should be adequately maintained and any breaks or leaks promptly repaired. Where any excavations are necessary, backfills shall be carefully and thoroughly compacted taking care that no voids or nests of cobbles or gravel are allowed to occur. Paragraph 208.10 (d) (1) of the prescribed regulations gives rules for the maintenance of drainage structures.

"Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

"(i) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

"(ii) Inlet and outlet channels are open;

"(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

"(iv) Erosion is not occurring adjacent to the structure which might endanger its water tightness or stability.

"Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections."

Locations where industrial process water and storm drain effluents are discharged onto the dumped rock slopes should be examined periodically to insure that there is no loss of slope material.

26. OPERATION. - Paragraph 208.10 (d) (2) of the prescribed regulations gives rules for operation of drainage structures. These rules are quoted below.

"Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of floodwater. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition."

As long as storm and other drains and ditches into the channel are draining freely they should present no special operating problems. Operation of the gate closures on the drainage structure running through the pumping station is covered fully in the Pumping Stations- Section F.

a. Fire Protection Water Line. - At Station 17+20, a 12-inch fire protection water line passes through the concrete floodwall. This line is equipped with a 12-inch post indicator valve on the land side of the wall. Under normal conditions, this valve is to remain wide open. In the event of a rupture of the fire line under the flood control structures, or on the land side of the protection, the post indicator valve should be closed.

b. Upstream Pressure Conduit. - There is a large gate structure located at Station 25+94 near the railroad tracks on the property line between the Chicopee Manufacturing Company and the U. S. Rubber Company. In this structure are two sluice gates. One is a 48-inch sluice gate with an invert at Elevation 82.33, the other is a 24-inch sluice gate with an invert at Elevation 90.03.

(1) Under both normal and flood conditions, the 48-inch gate should remain wide open and the 24-inch gate tightly closed.

(2) The lower level drainage system for the U. S. Rubber Company leading to the Oak Street Pumping Station, of necessity, has very little slope. This will lead to the deposition of sediment in this storm drain. To correct this condition, a means of flushing this drain is incorporated in the project.

(3) Flushing of the drain can be accomplished at any time during a localized storm causing local runoff not accompanied by a rise in the river level which would exceed elevation 90.0. This can be accomplished by opening the 24-inch gate completely and slowly closing the 48-inch gate until sufficient head is built up in the gate structure to cause water to flow in the 24-inch bypass.

TABLE II  
VALVE AND GATE OPERATIONS

<u>STRUCTURE</u>	<u>LOCATION</u>	<u>PLATE NO.</u>	<u>OPERATIONAL REQUIREMENTS</u>
Post Indicator Valve on 12" Fire Protection Water Line	Sta. 17+20	E-4	Emergency Closure only.
Sluice Gate Structure Upstream Pressure Conduit & 48" $\phi$ Gravity Discharge Conduit 24" $\phi$ Sluice Gate 48" $\phi$ Sluice Gate	Sta. 25+94	E-21	Sluice gates are operated for flushing lower level drainage system at U. S. Rubber Company.
Process Water Intake of U. S. Rubber Company River Gate Structure with 30" x 30" Sluice Gate	Sta. 48+00	E-11	Emergency Closure only.
Intake Gate Structure of U. S. Rubber Company 30" Wafer Butterfly Valve 30" Gate Valve	Sta. 48+00	E-11	30" Wafer butterfly is opera- ted to maintain water levels between El. 77 and El. 79 in existing intake structure. 30" Gate Valve, normally open, shall be closed if the cooling water pumps are stopped.
4' x 4' Discharge Conduit Oak St. Pumping Station 48" x 48" Sluice Gate on River Side of Dike	Sta. 49+20	E-11	Emergency Closure only.

c. Process Water Intake of U. S. Rubber Company. - Approximately 100 feet upstream from the Oak Street Pumping Station there is a 30-inch conduit through the dike for process water intake for the U. S. Rubber Company. When the river level is rising and reaches Elevation 79, the 30-inch wafer butterfly valve in the gate structure behind the dike should be throttled and constantly controlled to maintain the water level in the pit between Elevations 77 and 79. The elevation of the top of the gate structure is 84.5. Therefore, the water must be so controlled that the level at all times is between 5.5 and 7.5 feet below the top of the structure. This must be constantly watched as the level will change as the river level changes and also as the demand from the pumps change.

(1) The 30-inch gate valve also located in the gate structure should be closed if the cooling water pumps are stopped and the pressure through the wafer butterfly valve causes the water level in the pit to exceed Elevation 79.

(2) The sluice gate located on the river side of the dike should be kept open at all times. It should be closed only in the event of a rupture in the conduit between the 30-inch gate valve and the river.

#### F. PUMPING STATIONS

27. DESCRIPTION. - Two pumping stations were constructed by the Corps of Engineers in the City of Chicopee, to dispose of the interior drainage during high water periods. Each station is provided with sufficient pump capacity with one pump inoperable to discharge two-thirds of the design runoff based on the existing developments in the drainage areas. The storm water pumps are driven by diesel engines directly connected through flexible couplings to right angle gear units which transmit the power to the vertical pump shaft. The stations are provided with other facilities, such as trash racks, sluice gates, flap valves, overhead cranes, vent fans, sump pump, etc., to make a reliable, workable and complete installation.

##### a. Pumping Station Equipment.

(1) Main Street Pumping Station. - This pumping station contains two 18-inch diesel-engine-driven propeller pumps. A flap valve is provided on the discharge end of each pump to facilitate starting and prevent backflow through the pump. Stoplogs are provided for installing in slots on the river side of the flap valves

to permit maintenance and repair of the flap valves at all river conditions. The engines are radiator-cooled, and exhaust cooling air from the engine room is discharged to the outdoors. Each engine is equipped with a hydraulic cranking system consisting of a nitrogen precharged piston type accumulator, hydraulic cranking motor, starter control and associated equipment.

(a) Two electric operated sluice gates are provided, one on the inlet to the pump sump and the other on the gravity discharge conduit on the river side of the floodwall.

(b) Electricity is supplied by a single-phase 120/240 volt service for the sluice gate operators, vent fan, sump pump, dehumidifier, and lighting.

(2) Oak Street Pumping Station. - This station contains three 16-inch diesel engine-driven propeller pumps. Each pump discharge is equipped with a flap valve to facilitate starting and prevent backflow through the pumps. Stoplogs are provided same as for the Main Street Pumping Station. Engine cooling and starting systems are also the same as at the Main Street Pumping Station.

(a) Three electric operated and one hand operated sluice gates are provided at this station. The hand operated gate is on the river end of the discharge conduit and is left open at all times except for maintenance or rupture of the discharge conduit. One electric operated gate is on the entrance to the pump sump, one on the gravity discharge conduit at the station, and another on the interconnecting line between the incoming drain lines from the high level and low level drainage areas. This third sluice gate permits closing off the river to the low level drainage area, opening the sump gate and pumping the runoff from the low level area while still allowing runoff from the high level drainage area to flow to the river by gravity until the river stage rises to a level which would flood the high level area.

(b) Electric energy, same as at the Main Street Pumping Station, is supplied to this station.

## 28. MAINTENANCE. -

a. Regulations. - Paragraph 208.10(f)(1) of the prescribed regulations governs the maintenance of pumping stations:

"Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be

taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubricants for all types of machines, fuel for diesel powered equipment, and flashlights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable."

b. Recommendations of Division Engineer. - To help carry out the above-quoted regulations, the Division Engineer recommends the following:

(1) General. - Proper maintenance of the pumping stations requires periodic operation of all equipment at frequent intervals to keep equipment in good working order and all parts well lubricated and free from corrosion. Periodic operation of equipment also permits an inspection of the functioning of all equipment so that defective parts may be properly replaced or repaired before their use is required for pumping operations. Inasmuch as mechanical and electrical equipment deteriorates rapidly from idleness as well as from continued use, a thorough and complete maintenance routine is justified. The dehumidifier should be kept in operation at all times to prevent condensation of moisture on equipment within the building.

(2) Diesel Engines. -

(a) Twice a year, in the spring and fall, each engine should be run for two hours. The operation of the engines for this length of time is necessary to get the crankcase oil warmed up sufficiently to evaporate any fuel that entered the

crankcase during starting and to evaporate any moisture that is in the crankcase oil due to condensation. If the station is operated for flood purposes during either of these periods, this operation will meet the maintenance operation requirement. During this period of operation, the cut-out coupling between engine and gear unit shall be set so the pump does not operate. The functioning of the engine and accessories should be checked for proper performance. The following are the principal items to be checked:

(1) Oil Pressure.

(2) Water Temperature.

(b) Once each month, each engine, gear unit, and pump shall be operated for two to three minutes. This two to three minute operation may be run with the sump dry. DO NOT OPERATE ANY PUMP LONGER THAN THREE MINUTES DRY. This two to three minute operation will demonstrate that the engine will start properly and will be sufficient to circulate oil in the engines and gear units to all surfaces and will spread a grease coating on the grease lubricated shafts and bearings. If this short period of operation indicates any unusual noises in the pump or gear units, the unit should be shutdown immediately, the sump flooded and the unit operated as necessary to determine the source of trouble and necessary repairs.

(c) Oil in the engines should be changed twice a year or after every 100 hours of operation, whichever is more frequent. At the time of oil changing, the oil filter should be removed and replaced with new filter element.

(d) The drain valve at the base of the vertical exhaust pipes should be opened once a month while the engine is in operation to allow the condensate collected in the pipe to drain before it collects sufficiently to back up into the exhaust manifold and into the cylinders.

(e) The anti-freeze solution shall be drained and replaced annually. Permanent type anti-freeze shall be used at all times and shall be adequate for protection against freezing at minus 20° F.

(3) Pumps. - No maintenance of the propeller pumps is ordinarily required except that necessary to keep them painted and lubricated. The manual Farval grease lubricator on each pump should be operated to pump grease to each grease lubricated bearing prior to each pump operation and after each half hour during continuous operation. After each "wet sump" pump operation, the inside of the pump column, discharge elbow and the propeller and suction bell shall be flushed clean with hose using city water.



(4) Gear Units. - The gear units are fully enclosed oil lubricated. The oil level must be kept at the indicated level in the sight glass at all times. The oil in the gear units should be changed every two years.

(5) Sluice Gates. - Electrically operated gates should be moved through a complete closing and opening and closing cycle each month. The manually operated gate should be operated a few inches of travel each month and through full travel once yearly. There are on each electrically operated gate hoist some resistors located within the motor control panel in series with the indicating lights. Inasmuch as these resistors will emit a little heat when the indicating lights are on, it is recommended that at all times the feeders to the electrically operated sluice gates be kept energized and the indicating lights kept lighted so that the resistors will provide a little heat to combat any moisture that enters the control panel. The limit switches should be inspected once a year, and contacts cleaned. The stems of all gates should be kept completely coated with a water resistant lubricant at all times to prevent corrosion and provide lubrication.

(6) Sump Pumps. - Each station is provided with a sump pump to handle any seepage into the sump and to evacuate the sump after each pumping operation. The pumps and motors should be lubricated annually and the float mechanism checked monthly by manually raising and lowering the float to start and stop the pump. DO NOT ALLOW THE PUMP TO OPERATE MORE THAN ONE MINUTE WITHOUT WATER.

(7) Painting. - All metal surfaces not otherwise protected must be kept painted to maintain the metal in good condition. The exterior metal work, such as pipe railings, trash racks, cover plates, exterior gate hoist, flap valves, will require frequent painting because of exposure to the weather.

(8) Pump Sump. - After each period of high water during which the propeller pumps have been used, the sump should be emptied of water and the sump cleaned of all silt and debris. Most of the deposit on the floor can be washed into the sump pump by a stream of water from a hose and then removed with the sump pump. Any large debris, sticks, stones, rags, etc., should be removed manually. After the sump has been cleaned the sump pump should be cleaned of all foreign matter.

(9) Anchor Bolts. - At yearly intervals, all anchor bolts, piping bolts, Dresser coupling bolts, pump assembly bolts, and all similar parts shall be checked for tightness and tightened if necessary.

(10) Lubrication. - The two main requirements to keep equipment well lubricated are to operate equipment frequently to spread a film of lubricant over the bearing surfaces, and secondly to use proper kinds and grades of good lubricants. Cup greases should not be used on the equipment for any purpose because most cup greases have water as a binder. This moisture in contact with idle metal surfaces will corrode them in time. The types and grades of grease and oils should be in accordance with the equipment manufacturer's recommendations.

(11) Manufacturer's Drawings and Recommendations. - The Corps of Engineers has furnished the City of Chicopee a complete set of manufacturer's drawings pertaining to the mechanical and electrical equipment in the pumping stations. These drawings should be kept in good condition and available for reference at all times. If, for any reason, the drawings become damaged or lost, they should be replaced. The manufacturers will replace drawings for a nominal cost. The Operating and Maintenance Instructions of the engine manufacturers should be followed for diesel engine care.

## 29. OPERATION.

a. Regulations. - Paragraph 208.10(f)(2) of the prescribed regulations governs the operation of pumping stations:

"Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturer's instructions and drawings and with the 'Operating Instructions' for each station. The equipment shall be operated in accordance with the above-mentioned 'Operating Instructions' and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pump house sumps flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the Division Engineer following each flood."

b. General Operating Procedure. - The following instructions describe the general operating procedure:

Whenever the river stage reaches the stage at which the station is to be placed in operation, the sluice gate at the entrance to the station sump shall be opened and the gate in the gravity flow conduit closed. One or more pumps shall be operated as necessary to maintain

the water in the sump below the "High Water Elevation". The pumps should not be operated when the water level is below the "Low Water Elevation" as air will be sucked into the pumps causing vibration and cavitation. During periods of low inflow the engine may be operated at less than the rated speed to reduce the pumping capacity and thus avoid frequent stopping and starting of the engine.

c. Sump Level Indicators. - Station sump water level gages are installed on the south wall of the Main Street pumping station and on the north wall of the Oak Street station. Both gages indicate the water elevation in the sump in feet above mean sea level.

d. River Level Gages. - River level gages are installed on the west wall of the Main Street station and on the south wall of the Oak Street station. Both gages indicate the river elevation in feet above mean sea level.

e. Pumping Station Staffing Criteria. - Arrangements should be made with the U. S. Department of Commerce, Environmental Sciences Services Administration, 135 High Street, Hartford, Connecticut 06101 (telephone number 203-244-2014), to keep the city informed on flood predictions. The ESSA Weather Bureau maintains the River Forecast Center at Hartford and is the official agency for collecting precipitation and runoff data. Personnel at the Center prepare flood forecasts and are responsible for issuance of flood warnings in the Chicopee River basin.

The Main and Oak Streets pumping stations will be staffed when any of the following conditions develop:

(1) USWB Forecast. - When the Weather Bureau at Hartford forecasts flood stages equal to or higher than 12 feet (9,700 cfs) at the USGS gage at Indian Orchard, Massachusetts.

(2) Main Street pumping station. - When the river gage level is rising and reaches Elevation 81.5 msl.

(3) Oak Street pumping station. When the river gage level is rising and reaches Elevation 78.5 msl.

The operators will immediately make maintenance checks to insure operation of the stations and will periodically check the river level gages.

f. Main Street Pumping Station Operating Criteria. -

(1) Normal Gate Settings. - During non-flood periods the gates at the station will be in the following positions:

(a) Inlet sluice gate - closed.

(b) Discharge sluice gate - open.

(2) Flood Operations. - During a flood the station will be operated in the following sequence:

(a) Start Pumping. - When the river gage level at the pumping station rises to Elevation 82.5 msl, the operator will:

1. Open inlet sluice gate.
2. Start pump No. 1.
3. Close discharge sluice gate.
4. Shut off sump pump.

(b) Pump Operations. - Operate engine(s) and pump(s) according to the following schedule:

	<u>Pumps</u>	
	<u>No. 1</u>	<u>No. 2</u>
	<u>(sump gage elevation)</u>	
Start Pumps	82.5	83.0
Stop Pumps	78.3	78.8

The necessity for keeping the pumping station engines running and intermittently operating pumps will depend on the volume and rate of local inflow. It is entirely possible that the rainfall causing the flood or the local runoff will end before or while the river is still in flood. In this event, the discharge sluice gate will be kept closed and the engine(s) and pump(s) operated only as necessary to keep stages in the sump within operating limits.

(c) Terminate Pumping. - When the river recedes to Elevation 82.5 on the river level gage, the operator will:

1. Open the discharge sluice gate.
2. Stop pump(s) and engine(s).
3. Complete station log and prepare report for transmittal to Division Engineer.

(d) Draining and Cleaning Sump. - The sump will be allowed to drain with the receding river levels. When the river level drops to an elevation of about 76 feet, the operator will:

1. Close the inlet sluice gate.
2. Start sump pump.
3. Clean and flush sump as necessary.

When the sump is nearly empty, the flushing jets should be turned on and the pumping station sump immediately hosed and scrubbed down to remove any residual dye wastes before the waste material solidifies.

g. Oak Street Pumping Station Operating Criteria. -

(1) Normal Gate Settings. - During non-flood periods the gates at the station will be in the following positions:

- (a) Inlet sluice gate (under) - closed.
- (b) Discharge sluice gate (under) - open.
- (c) Discharge sluice gate (floorstand on roof) - open.

(2) Flood Operations. - During a flood the station will be operated in the following sequence:

(a) Start Pumping. - When the river gage level at the pumping station rises to Elevation 79.0 msl, the operator will:

1. Open inlet sluice gate (under)(see Plate E-50).
2. Start pump No. 1.
3. Close discharge sluice gate (under) (floorstand outside of pumping station - see Plate E-50).
4. Shut off sump pump.

(b) Pump Operations. - Operate engine(s) and pump(s) according to the following schedule:

	Pumps		
	No. 1	No. 2	No. 3
	(sump gage elevation msl)		
Start Pumps	79.0	79.5	80.0
Stop Pumps	75.0	75.5	76.0

The necessity for keeping the pumping station engines running and intermittently operating pumps will depend on the volume and rate of local inflow. It is entirely possible that the rainfall causing the flood or the local runoff will end before or while the river is still in flood. In this event, the engine(s) and pump(s) will be operated only as necessary to keep stages in the sump within operating limits.

(c) River Level Rises to Elevation 90. - When the river level rises to Elevation 90, the operator will:

1. Open the discharge sluice gate (under) and simultaneously,
2. Close the discharge sluice gate (floorstand on roof).

(d) River Level Recedes to Elevation 90. - When the river level recedes to Elevation 90, the operator will:

1. Close the discharge sluice gate (under) and simultaneously,
2. Open the discharge sluice gate (floorstand on roof).

(e) River Level Recedes to Elevation 79. - When the river level recedes to Elevation 79, the operator will:

1. Open the discharge sluice gate (under).
2. Stop pump(s) and engine(s).
3. Complete station logs and prepare report for transmittal to Division Engineer.

(f) Draining and Cleaning Sump. - The sump will be allowed to drain with the receding river levels. When the river level drops to about Elevation 75, the operator will:

1. Close the inlet sluice gate (under).
2. Start sump pump.
3. Clean and flush sump as necessary.

h. Station Log. - The operators will maintain station logs of station operations. In addition, at half-hour intervals after going on alert, they will record river levels from the river level gages. This record will aid in evaluation of the operating procedures. The actual operation experience will indicate where adjustments in the prescribed regulations can improve the functioning of the Chicopee Falls protective system.

#### G. MISCELLANEOUS FACILITIES

30. DESCRIPTION. Miscellaneous structures and facilities constructed as part of the protective works include the bituminous concrete mounds.

31. MAINTENANCE.

a. Paragraph 208.10(h)(1) of the prescribed regulations governs the maintenance of miscellaneous facilities:

"Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior runoff during flood periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows."

b. Bituminous Concrete Mounds. - The purpose of the bituminous concrete mounds is to intercept surface runoff and to divert the water to near-by drain inlets. Because of the steep slopes of the interior drainage areas, there will be a rapid concentration of runoff during any period of high intensity rainfall. Rainfall rates will vary from 4.30 inches per hour for short times to 2.05 inches per hour for the longest concentration times.

Any surface water not intercepted and diverted by the bituminous concrete mounds will continue down the slopes and cause temporary ponding on the landside of the dikes and floodwalls. For this reason, it is essential to maintain these mounds in good condition at all times.

32. OPERATION.

a. Regulations. - Paragraph 208.10(h)(2) of the prescribed regulations governs the operation of miscellaneous facilities.

"Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the Division Engineer unless designed therefor."

b. Debris Removal. - During a flood or heavy rainfall, observations for debris should be made at the bituminous concrete mounds. Debris could block the flow of water to the drain inlets. Men and equipment should be available within reasonable time and distance to assist in debris removal wherever necessary.

H. OPERATIONS PLAN

33. PROJECT OPERATION. - A considered and practiced plan or project operation should be in readiness at all times. Severe floods can occur at any time of year. Fortunately, a few hours warning time should be available for local authorities to mobilize men and equipment for serious flood conditions. However, trained operators will be required at the Pumping Stations and manpower and equipment should be on call for duty on the various project features to insure maximum project operation and efficiency.

34. COOPERATION. - Representatives of the Division Engineer stand ready to assist the City in the operation of the project. This in no way lessens the responsibility of the Commonwealth or the City in the operation of the project.



APPENDIX A

REGULATIONS PRESCRIBED BY THE  
SECRETARY OF THE ARMY

# TITLE 33—NAVIGATION AND NAVIGABLE WATERS

## Chapter II—Corps of Engineers, War Department

### PART 208—FLOOD CONTROL REGULATIONS MAINTENANCE AND OPERATION OF FLOOD CONTROL WORKS

Pursuant to the provisions of section 3 of the Act of Congress approved June 22, 1936, as amended and supplemented (49 Stat. 1571; 50 Stat. 877; and 55 Stat. 638; 33 U. S. C. 701c; 701c-1), the following regulations are hereby prescribed to govern the maintenance and operation of flood control works:

§ 208.10 *Local flood protection works; maintenance and operation of structures and facilities*—(a) *General*. (1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent," who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States.

(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times.

(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the right-of-way for the protective facilities.

(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the War Department or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

(6) It shall be the duty of the Superintendent to submit a semiannual report to the District Engineer covering inspection, maintenance, and operation of the protective works.

(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works.

(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made.

(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods.

(10) The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations.

(b) *Levees*—(1) *Maintenance*. The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

(i) No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;

(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section;

(iii) No seepage, saturated areas, or sand boils are occurring;

(iv) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

(v) Drains through the levees and gates on said drafts are in good working condition;

(vi) No revetment work or riprap has been displaced, washed out, or removed;

(vii) No action is being taken, such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod;

(viii) Access roads to and on the levee are being properly maintained;

(ix) Cattle guards and gates are in good condition;

(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;

(xi) There is no unauthorized grazing or vehicular traffic on the levees;

(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days, and such intermediate times as may be necessary to insure the best possible care of

the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent.

(2) *Operation*. During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

(i) There are no indications of slides or sloughs developing;

(ii) Wave wash or scouring action is not occurring;

(iii) No low reaches of levee exist which may be overtopped;

(iv) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

(c) *Flood walls*—(1) *Maintenance*. Periodic inspections shall be made by the Superintendent to be certain that:

(i) No seepage, saturated areas, or sand boils are occurring;

(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

(iii) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

(vii) No bank caving conditions exist riverward of the wall which might endanger its stability;

(viii) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.

Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice.

(2) *Operation*. Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall.

(d) *Drainage structures*—(1) *Maintenance*. Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on

drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

(i) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

(ii) Inlet and outlet channels are open;

(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

(iv) Erosion is not occurring adjacent to the structure which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections.

(2) *Operation.* Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition.

(c) *Closure structures.*—(1) *Maintenance.* Closure structures for traffic openings shall be inspected by the superintendent every 90 days to be certain that:

(i) No parts are missing;

(ii) Metal parts are adequately covered with paint;

(iii) All movable parts are in satisfactory working order.

(iv) Proper closure can be made promptly when necessary;

(v) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency.

Tools and parts shall not be removed for other use. Trial erections of one or more closure structures shall be made once each year, alternating the structures chosen so that each gate will be erected at least once in each 3-year period. Trial erection of all closure structures shall be made whenever a change is made in key operating personnel. Where railroad operation makes trial erection of a closure structure infeasible, rigorous inspection and drill of operating personnel may be substituted therefor. Trial erection of sand bag closures is not required. Closure materials will be carefully checked prior to and following flood periods, and damaged or missing parts shall be repaired or replaced immediately.

(2) *Operation.* Erection of each movable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given

in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them.

(f) *Pumping plants.*—(1) *Maintenance.* Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubricants for all types of machines, fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

(2) *Operation.* Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturers' instructions and drawings and with the "Operating Instructions" for each station. The equipment shall be operated in accordance with the above-mentioned "Operating Instructions" and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pump house sumps flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the District Engineer following each flood.

(g) *Channels and floodways.*—(1) *Maintenance.* Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

(i) The channel or floodway is clear of debris, weeds, and wild growth;

(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;

(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;

(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;

(v) Riprap sections and deflection dikes and walls are in good condition;

(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works.

Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary.

(2) *Operation.* Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired.

(h) *Miscellaneous facilities.*—(1) *Maintenance.* Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior run-off during flood periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows.

(2) *Operation.* Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor. (49 Stat. 1571, 50 Stat. 877; and 55 Stat. 638; 33 U.S.C. 701c; 701c-1) (Regs. 9 August 1944, CE SPEWF)

[SEAL]

J. A. ULIO,  
Major General,  
The Adjutant General.

[P. R. Doc. 44-12285; Filed August 16, 1944;  
9:44 a. m.]

APPENDIX B

ASSURANCES OF LOCAL COOPERATION  
COMMONWEALTH OF MASSACHUSETTS

ASSURANCE  
OF THE  
COMMONWEALTH OF MASSACHUSETTS

WHEREAS, the project for flood protection on the Chicopee River, Massachusetts, is authorized by Act of Congress approved July 14, 1960, Public Law 86-645, and in accordance with the plans and recommendations in House Document No. 434, 86th Congress, 2nd Session, to provide, among other things, local flood protection for Chicopee Falls consisting of channel enlargement, levees, concrete flood walls, and appurtenant works;

WHEREAS, this portion of the project within the limits indicated on plans prepared by the U. S. Army Engineer Division, New England, Corps of Engineers, can be completed at a cost now estimated to be One Million Seven Hundred Seventy Thousand Dollars (\$1, 770, 000. 00) for construction; and

WHEREAS, local interests desiring the prosecution of this portion of the project are agreeable that certain assurances for local cooperation will be executed;

NOW, THEREFORE, the Commonwealth of Massachusetts, acting by and through its Water Resources Commission, in compliance with the conditions contained in House Document No. 434, 86th Congress, 2nd Session, will:

(a) Contribute 20% of the first cost of the project, said 20% being presently estimated at Three Hundred Fifty-Four Thousand Dollars (\$354, 000. 00), including the value of lands, easements, and rights-of-way, the actual cost of construction to be determined upon completion of the project;

(b) Acquire, where direct purchase can be effected as hereinafter outlined, all lands, easements, and rights-of-way required for the project;

costs so incurred and so paid, including administrative expenses involved, will be credited to the contribution referred to in (a) above;

(c) Hold and save the United States free from damages due to the construction works;

(d) Permit no encroachment on improved channels or on ponding areas, and, if ponding areas or capacities are impaired, provide substitute storage capacity or equivalent pumping capacity promptly without cost to the United States; and

(e) Maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of the Army.

FURTHER, the Commonwealth of Massachusetts acting by and through its Water Resources Commission does:

(1) Agree that the value of the lands, easements, and rights-of-way to be acquired by it shall be determined by an independent appraiser or appraisers, the selection of whom shall be approved in advance by the Division Engineer, U. S. Army Engineer Division, New England, or his authorized representative;

(2) Agree that the fees to be paid to approved appraisers will be likewise approved in advance by the Division Engineer, U. S. Army Engineer Division, New England, or his authorized representative, before such services are actually procured;

(3) Agree that the appraised values of any lands, easements, and rights-of-way to be acquired shall be approved in advance by the Division Engineer, U. S. Army Engineer Division, New England, or his authorized representative, prior to commencement of negotiations for purchase with the owners;

(4) Agree, in conducting negotiations for purchase with owners, to comply with the policy announced by the Congress in Section 301, Public Law 86-645, approved 14 July 1960 and Corps of Engineers implementation thereof; the policy and procedure will be more fully discussed in conferences between Corps of Engineers and Commonwealth of Massachusetts representatives which will be initiated promptly upon the execution of this assurance;

(5) Consent, where direct purchase is not effected under the Congressional Policy and Corps of Engineers procedure referred to in (4) above, to the entry of a condemnation proceeding in the U. S. District Court for the District of Massachusetts, by the United States Attorney's office, which action contemplates such purchases to be made by an exercise of the U. S. Government's right of eminent domain;

(6) Agree, where purchase is effected as contemplated in (4) above, to furnish funds for deposit into the Registry of the Court at the time of filing of the Declaration of Taking, such funds to be based on the amounts of the appraised values previously approved by the Division Engineer; and agree, further, to furnish additional funds, as needed, to pay deficiency judgments which amounts will be the difference between amounts on deposit and the amounts of the awards finally made by the Court; funds so furnished hereunder will be charged as project costs and will be credited to the contribution referred to in (a) above.

IN WITNESS WHEREOF, the Commonwealth of Massachusetts, acting by and through its Water Resources Commission, as authorized by Chapter 552, of the Acts of 1962, has executed the within assurance this

12th day of February 1963.

COMMONWEALTH OF MASSACHUSETTS  
WATER RESOURCES COMMISSION

BY Clarence I. Sterling, Jr.

CLARENCE I. STERLING, JR.  
Director and Chief Engineer  
Authorized to sign by vote of the  
Water Resources Commission on  
July 9, 1962.

ACCEPTANCE

The within assurance is hereby accepted for and on behalf of the  
United States of America.

14 February 1963

BY P. C. Hyzer

P. C. HYZER  
Colonel, Corps of Engineers  
Division Engineer



**APPENDIX C**

**INSPECTION REPORT FORMS**

FLOOD PROTECTIVE WORKS  
CHICOPEE FALLS LOCAL PROTECTION PROJECT  
INSPECTION REPORT

CHECK LIST

Use with NED Form 513 - Inspection Report

1. Pumping Stations

a. Structures

- (1) Walls \_\_\_\_\_
- (2) Roofs \_\_\_\_\_
- (3) Painting \_\_\_\_\_

b. Pumps, Motors, Engines

- (1) When trial operated \_\_\_\_\_
- (2) Lubrication \_\_\_\_\_
- (3) Oil changes \_\_\_\_\_
- (4) Emergency lighting \_\_\_\_\_
- (5) Motor insulation tests \_\_\_\_\_
- (6) Heating \_\_\_\_\_
- (7) Metal intakes, etc. \_\_\_\_\_
- (8) Diesel fuel \_\_\_\_\_

c. Gates

- (1) When trial operated \_\_\_\_\_
- (2) General condition \_\_\_\_\_
- (3) Leaks \_\_\_\_\_
- (4) Lubrication \_\_\_\_\_
- (5) Electrical systems \_\_\_\_\_
- (6) Manual closure \_\_\_\_\_
- (7) Painting \_\_\_\_\_

2. Gates, Drainage Structures

a. Gates and Valves

- (1) When trial operated \_\_\_\_\_
- (2) General condition \_\_\_\_\_
- (3) Leaks \_\_\_\_\_
- (4) Lubrication \_\_\_\_\_
- (5) Painting \_\_\_\_\_

b. Drainage Structures

- (1) Date inspected by Superintendent \_\_\_\_\_
- (2) General condition of manholes, walls,  
ditches, conduits and culverts \_\_\_\_\_
- (3) Has capacity been reduced by growth  
of vegetation or by trash dumpage? \_\_\_\_\_

### 3. Dikes

- a. Date inspected by Superintendent \_\_\_\_\_
- b. General Condition \_\_\_\_\_
- c. Condition of slopes/erosion/grass \_\_\_\_\_
- d. Condition of top \_\_\_\_\_
- e. Sand boils/caving \_\_\_\_\_
- f. Are there any burrowing animal holes  
in dike? \_\_\_\_\_
- g. Trespassing \_\_\_\_\_
  - (1) Are there any paths on dike? \_\_\_\_\_
  - (2) Has right-of-way been used for  
dumping or storage of materials? \_\_\_\_\_
- h. Condition of rock slope protection \_\_\_\_\_
- i. Condition of toe drains \_\_\_\_\_
- j. Describe deficiencies, including location,  
and corrective measures planned. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### 4. Stop-Logs (Pumping Stations)

- a. Condition of logs \_\_\_\_\_
- b. Availability of logs \_\_\_\_\_
- c. Correct number of logs \_\_\_\_\_
- d. Condition of stop log slots \_\_\_\_\_
- e. Condition of storage facilities \_\_\_\_\_

### 5. Log Boom - N/A (not applicable)

### 6. Channels

- a. Date inspected by Superintendent \_\_\_\_\_
- b. General condition of channel \_\_\_\_\_
- c. Has the capacity of the channel been  
reduced due to growth of vegetation,  
shoaling, or other encroachments? \_\_\_\_\_
- d. General condition of rock slope protection \_\_\_\_\_
- e. Has there been any removal of rock? \_\_\_\_\_
- f. Has there been any movement of the rock  
slope protection? \_\_\_\_\_
- g. Describe deficiencies, including location,  
and corrective measures planned \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Concrete Structures (Floodwalls, pressure manholes, etc.)

- a. Date inspected by Superintendent \_\_\_\_\_
- b. General condition of concrete \_\_\_\_\_
- c. Any evidence of surface deterioration? \_\_\_\_\_
- d. Any development of cracks? \_\_\_\_\_
- e. Any evidence of movement or settlement? \_\_\_\_\_
- f. Any cracking or spalling of concrete  
at joints? \_\_\_\_\_
- g. Condition of subdrains \_\_\_\_\_
- h. Trespassing
  - (1) Are there any signs painted on or  
attached to the structures? \_\_\_\_\_
  - (2) Are there any clotheslines or other  
items attached to the structures? \_\_\_\_\_
- i. Describe deficiencies, including location,  
and corrective measures planned \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. Miscellaneous

- a. Is emergency operation plan up-to-date? \_\_\_\_\_
- b. Is sufficient emergency equipment avail-  
able at all times? \_\_\_\_\_
- c. Is sufficient manpower available at all  
times? \_\_\_\_\_
- d. Is the emergency equipment in good  
working condition? \_\_\_\_\_
- e. Has the semi-annual report been submitted? \_\_\_\_\_

9. General

- a. Have all deficiencies noted in previous  
Inspection Report been corrected? \_\_\_\_\_
- b. Has any high water been experienced since  
the last Inspection Report? \_\_\_\_\_  
If so, describe briefly, including  
dates, height of water, and effect  
on protective works. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10. Remarks and Additional Comments

Indicate Observations, Discussions, Specific Feature Deficiencies, Recommendations and any other pertinent information. Use continuation sheet if necessary.

# LOCAL FLOOD PROTECTION PROJECT INSPECTION REPORT

**Project:**

Maintaining Agency:

Type Inspection: \_\_\_\_\_ Semi-Annual Staff \_\_\_\_\_ 90 Day Interim

River Basin: \_\_\_\_\_ Date of Inspection \_\_\_\_\_

Feature	Sat	Unsat	Deficiencies
<b>PUMPING STATIONS - STRUCTURES</b>			
INTERIOR			
EXTERIOR			
<b>PUMPS - MOTORS - ENGINES</b>			
TRIAL OPERATED			
GENERAL CONDITION			
POWER SOURCE			
INSULATION TESTS			
METAL INTAKES/OUTLETS			
GATE VALVES			
<b>GATES - DRAINAGE STRUCTURES</b>			
TRIAL OPERATED			
GENERAL CONDITION			
LUBRICATION			
<b>DIKES - DAMS</b>			
GENERAL CONDITION			
SLOPES/EROSION			
SAND BOILS/CAVING			
TRESPASSING			
SLOPE PROTECTION			
DRAINS			
<b>STOP-LOGS - LOG BOOM</b>			
CONDITION OF LOGS			
AVAILABILITY OF LOGS			
HIGHWAY SLOTS			
STORAGE FACILITIES			
<b>CHANNELS - OUTLET WORKS CHANNEL</b>			
BANKS			
OBSTRUCTION CONTROL			





DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02154

IN REPLY REFER TO  
NEDOD-R

TO: Superintendent, Local Flood Protection System

REFERENCE: Code of Federal Regulations, Title 33, Section 208.10 (a) (6),  
Local Flood Protection Works

Assurances given by local cooperating agencies prior to construction of Local Protection Projects require the submission of a semi-annual report to the Division Engineer. As "Superintendent" of your project this becomes your responsibility. This brochure is intended to help you in preparing your reports.

We hope that you do not have the misconception that these reports are valueless, for they serve a definite and useful purpose. Statistical information derived from these reports is invaluable for future design and also for evaluating effectiveness of the present protection system. The semi-annual reports, when properly submitted, provide information on conditions that often indicate the necessity for changes or modification to the existing system. In short, they help us to determine whether the project is doing the job for which it was built.

Attached are samples of good reports which might help you in preparing yours.

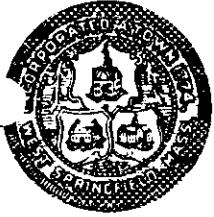
Exhibit "A" is the semi-annual report. It is submitted in letter form. Basically it covers the five (5) specific areas of information required in the "Reports" paragraph of the standard project O&M Manual. It should be brief but complete. Negative replies to outline paragraphs should be submitted, if applicable.

Exhibits "B" and "C" are the 90-day interim reports required as attachments to the semi-annual report. Additional reports of conditions "before" and "after" floods should also be attached when applicable. NED Form 513 is now used instead of suggested report forms normally found in Appendix "C" of the O&M Manual.

Exhibit "D" contains an excerpt from Part 208, Title 33, United States Code. This contains Flood Control Regulations for use in Maintenance and Operation of Flood Control Works.

If you have any difficulties at all in preparing your reports, please don't hesitate to talk it over with our people during their visits to your project.





# TOWN OF WEST SPRINGFIELD, MASSACHUSETTS

## ENGINEERING DEPT.

INCLUDING STREETS, SEWERS, DIKES, ASH COLLECTIONS AND SIDEWALKS

WALLACE W. WYMAN  
TOWN ENGINEER  
JOHN J. BRENNAN  
ASST. SUPT. OF STREETS  
ARTHUR F. BINGHAM  
ASST. TOWN ENGINEER

TEL. RE 3-7831  
EXT. 37, 42, 44, 55

HOURS:  
YARD: 7 A.M. - 4 P.M.  
OFFICES: 8:30 A.M. - 5 P.M.

September 8, 1964

Division Engineer  
U. S. Army Engineers  
New England Division  
484 Trapelo Road  
Waltham, Mass. 02154

Re: Semi-annual Dike Inspection Report on West Springfield Dikes

Dear Sirs:

As required by your regulations I wish to report that the following maintenance work has been performed during the past six months:

All sodded dikes have been mowed and raked at regular intervals. Eroded portions of the surface have been repaired with loam and seed. Weeds in the rip-rapped areas have been sprayed with a weed killing spray. All dikes have been patrolled and checked at regular intervals. The vitrified clay pipes at the tops of all relief wells at the toe of the Riverdale Dike have been cleaned, repaired or replaced, as necessary.

We use a permanent crew of one foreman, one equipment operator and one maintenance man augmented by two or three laborers during the summer months.

A request for bids on the replacement of the first engine in the Warren Street pumping station is being advertised this month. We are requesting some quotations on exterior waterproofing of the older stations and will do as much as we can with the available funds. Three mufflers need repairs to the muffler or insulation jacket. This will be done.

All engines are started and test operated once a week. All stations have had resistance tests made during the summer.

EXHIBIT A

There have been nothing but compliments made regarding the maintenance and operation of the dike system. The Town Meeting has never refused any legitimate request for funds for repair or operation.

Very truly yours,

/s/ Wallace W. Wyman

WWW:ck

2 Incls:

1. Interim Inspection Report dtd. 6 May 1964
2. Interim Inspection Report dtd. 27 Aug. 1964

# LOCAL FLOOD PROTECTION PROJECT INSPECTION REPORT

**Project:** West Springfield Dike System

**Maintaining Agency:** Town of West Springfield, Massachusetts

**Type Inspection:** \_\_\_\_\_ Semi-Annual Staff X 90 Day Interim

**River Basin:** Connecticut River

**Date of Inspection:** May 17, 04

Feature	Sat	Unsat	Deficiencies
<b>PUMPING STATIONS - STRUCTURES</b>			
INTERIOR	X		
EXTERIOR	X		waterproofing of walls to be scheduled.
<b>PUMPS - MOTORS - ENGINES</b>			
TRIAL OPERATED	X		
GENERAL CONDITION	X		Pump Engine Replacement Program has been
POWER SOURCE	X		initiated.
INSULATION TESTS	X		Insulation tests required.
METAL INTAKES/OUTLETS	X		
GATE VALVES	X		
<b>GATES - DRAINAGE STRUCTURES</b>			
TRIAL OPERATED	X		See Remarks
GENERAL CONDITION	X		
LUBRICATION	X		
<b>DIKES - DAMS</b>			
GENERAL CONDITION	X		
SLOPES/EROSION	X		
SAND BOILS/CAVING	X		
TRESPASSING	X		Dikes in need of barriers to prevent access.
SLOPE PROTECTION	X		
DRAINS	X		
<b>STOP-LOGS - LOG BOOM</b>			
CONDITION OF LOGS	X		
AVAILABILITY OF LOGS	X		
HIGHWAY SLOTS	X		See Remarks
STORAGE FACILITIES	X		See Remarks
<b>CHANNELS - OUTLET WORKS CHANNEL - Not Applicable</b>			
BANKS			
OBSTRUCTION CONTROL			

Feature	Sat	Unsat	Deficiencies
<b>CONCRETE STRUCTURES</b>			
SURFACE	X		
SETTLEMENT	X		
JOINTS	X		
DRAINS	X		
<b>MISCELLANEOUS</b>			
EMERGENCY OPER. PLAN	X		
EMERGENCY EQUIPMENT	X		
SEMI-ANNUAL REPORT	X		
CONDUITS	X		
FLAP VALVES	X		
<b>Inspection Party:</b> Wallace W. Wyman, Town Engineer, West Springfield, Mass.			
<b>Photographs Taken:</b> None Required			
<b>Remarks &amp; Additional Comments:</b> ( Indicate Here Observations, Discussions, Specific Feature Deficiencies, Recommendations and any other pertinent information. Use Continuation Sheet if necessary.) <u>GATES:</u> Gates were not operated during inspection. Riverdale, Bridge Street and Circuit Avenue stations were in operation during river flood stages in April. <u>HIGHWAY SLOTS:</u> Two Highway Slot Frames need minor repair and resetting. <u>STORAGE FACILITIES:</u> Vertical cracking in storage structure evident. Need re-jointing.			
X ALL APPLICABLE ITEMS. IF UNSAT INDICATE SPECIFIC DEFICIENCIES. INDICATE IF NOT APPLICABLE.			
DATE 5 May 1954	INSPECTED BY: TYPED NAME & TITLE Wallace W. Wyman, Town Engineer		SIGNATURE /s/ Wallace W. Wyman

# LOCAL FLOOD PROTECTION PROJECT INSPECTION REPORT

**Project:** West Springfield Dike System

**Maintaining Agency:** Town of West Springfield, Massachusetts

**Type Inspection:** \_\_\_\_\_ Semi-Annual Staff   X   90 Day Interim

**River Basin:** Connecticut River

**Date of Inspection:** 27 August 1964

Feature	Sat	Unsat	Deficiencies
<b>PUMPING STATIONS - STRUCTURES</b>			
INTERIOR	X		
EXTERIOR	X		Walls to be waterproofed next month.
<b>PUMPS - MOTORS - ENGINES</b>			
TRIAL OPERATED	X		
GENERAL CONDITION	X		Three mufflers need repairs.
POWER SOURCE	X		
INSULATION TESTS	X		To be made next month.
METAL INTAKES/OUTLETS	X		
GATE VALVES	X		
<b>GATES - DRAINAGE STRUCTURES</b>			
TRIAL OPERATED	X		
GENERAL CONDITION	X		
LUBRICATION	X		
<b>DIKES - DAMS</b>			
GENERAL CONDITION	X		
SLOPES/EROSION	X		
SAND BOILS/CAVING	X		None Found
TRESPASSING	X		
SLOPE PROTECTION	X		
DRAINS	X		Repairs made this summer.
<b>STOP-LOGS - LOG BOOM</b>			
CONDITION OF LOGS	X		
AVAILABILITY OF LOGS	X		
HIGHWAY SLOTS	X		
STORAGE FACILITIES	X		walls to be waterproofed.
<b>CHANNELS - OUTLET WORKS CHANNEL - Not Applicable</b>			
BANKS			
OBSTRUCTION CONTROL			

Feature	Sat	Unsat	Deficiencies
<b>CONCRETE STRUCTURES</b>			
SURFACE	X		
SETTLEMENT	X		
JOINTS	X		
DRAINS	X		
<b>MISCELLANEOUS</b>			
EMERGENCY OPER. PLAN	X		
EMERGENCY EQUIPMENT	X		
SEMI-ANNUAL REPORT	X		
CONDUITS	X		
FLAP VALVES	X		
<b>Inspection Party:</b>  Wallace W. Wyman, Town Engineer, West Springfield, Mass.			
<b>Photographs Taken:</b>  None Required			
<b>Remarks &amp; Additional Comments:</b>  ( Indicate Here Observations, Discussions, Specific Feature Deficiencies, Recommendations and any other pertinent information. Use Continuation Sheet if necessary. )			
X ALL APPLICABLE ITEMS. IF UNSAT INDICATE SPECIFIC DEFICIENCIES. INDICATE IF NOT APPLICABLE.			
DATE	INSPECTED BY: TYPED NAME & TITLE		SIGNATURE
27 Aug 1964	Wallace W. Wyman, Town Engineer		/s/ Wallace W. Wyman

## TITLE 33—NAVIGATION AND NAVIGABLE WATERS

### Chapter II—Corps of Engineers, War Department

#### PART 208—FLOOD CONTROL REGULATIONS MAINTENANCE AND OPERATION OF FLOOD CONTROL WORKS

Pursuant to the provisions of section 3 of the Act of Congress approved June 22, 1936, as amended and supplemented (49 Stat. 1571; 50 Stat. 877; and 55 Stat. 639; 33 U. S. C. 701c; 701c-1), the following regulations are hereby prescribed to govern the maintenance and operation of flood control works:

§ 208.10 *Local flood protection works; maintenance and operation of structures and facilities*—(a) *General.* (1) The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits.

(2) The State, political subdivision thereof, or other responsible local agency, which furnished assurance that it will maintain and operate flood control works in accordance with regulations prescribed by the Secretary of War, as required by law, shall appoint a permanent committee consisting of or headed by an official hereinafter called the "Superintendent," who shall be responsible for the development and maintenance of, and directly in charge of, an organization responsible for the efficient operation and maintenance of all of the structures and facilities during flood periods and for continuous inspection and maintenance of the project works during periods of low water, all without cost to the United States.

(3) A reserve supply of materials needed during a flood emergency shall be kept on hand at all times.

(4) No encroachment or trespass which will adversely affect the efficient operation or maintenance of the project works shall be permitted upon the right-of-way for the protective facilities.

(5) No improvement shall be passed over, under, or through the walls, levees, improved channels or floodways, nor shall any excavation or construction be permitted within the limits of the project right-of-way, nor shall any change be made in any feature of the works without prior determination by the District Engineer of the War Department or his authorized representative that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice. Advice regarding the effect of proposed improvements or alterations on the functioning of the project and information concerning methods of construction acceptable under standard engineering practice shall be obtained from the District Engineer or, if otherwise obtained, shall be submitted for his approval. Drawings or prints showing such improvements or alterations as finally constructed shall be furnished the District Engineer after completion of the work.

(6) It shall be the duty of the Superintendent to submit a semiannual report to the District Engineer covering inspection, maintenance, and operation of the protective works.

(7) The District Engineer or his authorized representatives shall have access at all times to all portions of the protective works.

(8) Maintenance measures or repairs which the District Engineer deems necessary shall be promptly taken or made.

(9) Appropriate measures shall be taken by local authorities to insure that the activities of all local organizations operating public or private facilities connected with the protective works are coordinated with those of the Superintendent's organization during flood periods.

(10) The War Department will furnish local interests with an Operation and Maintenance Manual for each completed project, or separate useful part thereof, to assist them in carrying out their obligations under these regulations.

(b) *Levees*—(1) *Maintenance.* The Superintendent shall provide at all times such maintenance as may be required to insure serviceability of the structures in time of flood. Measures shall be taken to promote the growth of sod, exterminate burrowing animals, and to provide for routine mowing of the grass and weeds, removal of wild growth and drift deposits, and repair of damage caused by erosion or other forces. Where practicable, measures shall be taken to retard bank erosion by planting of willows or other suitable growth on areas riverward of the levees. Periodic inspections shall be made by the Superintendent to insure that the above maintenance measures are being effectively carried out and, further, to be certain that:

(i) No unusual settlement, sloughing, or material loss of grade or levee cross section has taken place;

(ii) No caving has occurred on either the land side or the river side of the levee which might affect the stability of the levee section;

(iii) No seepage, saturated areas, or sand boils are occurring;

(iv) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged;

(v) Drains through the levees and gates on said drains are in good working condition;

(vi) No revetment work or riprap has been displaced, washed out, or removed;

(vii) No action is being taken, such as burning grass and weeds during inappropriate seasons, which will retard or destroy the growth of sod;

(viii) Access roads to and on the levee are being properly maintained;

(ix) Cattle guards and gates are in good condition;

(x) Crown of levee is shaped so as to drain readily, and roadway thereon, if any, is well shaped and maintained;

(xi) There is no unauthorized grazing or vehicular traffic on the levees;

(xii) Encroachments are not being made on the levee right-of-way which might endanger the structure or hinder its proper and efficient functioning during times of emergency.

Such inspections shall be made immediately prior to the beginning of the flood season; immediately following each major high water period, and otherwise at intervals not exceeding 90 days, and such intermediate times as may be necessary to insure the best possible care of

the levee. Immediate steps will be taken to correct dangerous conditions disclosed by such inspections. Regular maintenance repair measures shall be accomplished during the appropriate season as scheduled by the Superintendent.

(2) *Operation.* During flood periods the levee shall be patrolled continuously to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

(i) There are no indications of slides or sloughs developing;

(ii) Wave wash or scouring action is not occurring;

(iii) No low reaches of levee exist which may be overtopped;

(iv) No other conditions exist which might endanger the structure.

Appropriate advance measures will be taken to insure the availability of adequate labor and materials to meet all contingencies. Immediate steps will be taken to control any condition which endangers the levee and to repair the damaged section.

(c) *Flood walls*—(1) *Maintenance.* Periodic inspections shall be made by the Superintendent to be certain that:

(i) No seepage, saturated areas, or sand boils are occurring;

(ii) No undue settlement has occurred which affects the stability of the wall or its water tightness;

(iii) No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths;

(iv) The concrete has not undergone cracking, chipping, or breaking to an extent which might affect the stability of the wall or its water tightness;

(v) There are no encroachments upon the right-of-way which might endanger the structure or hinder its functioning in time of flood;

(vi) Care is being exercised to prevent accumulation of trash and debris adjacent to walls, and to insure that no fires are being built near them;

(vii) No bank caving conditions exist riverward of the wall which might endanger its stability;

(viii) Toe drainage systems and pressure relief wells are in good working condition, and that such facilities are not becoming clogged.

Such inspections shall be made immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. Measures to eliminate encroachments and effect repairs found necessary by such inspections shall be undertaken immediately. All repairs shall be accomplished by methods acceptable in standard engineering practice.

(2) *Operation.* Continuous patrol of the wall shall be maintained during flood periods to locate possible leakage at monolith joints or seepage underneath the wall. Floating plant or boats will not be allowed to lie against or tie up to the wall. Should it become necessary during a flood emergency to pass anchor cables over the wall, adequate measures shall be taken to protect the concrete and construction joints. Immediate steps shall be taken to correct any condition which endangers the stability of the wall.

(d) *Drainage structures*—(1) *Maintenance.* Adequate measures shall be taken to insure that inlet and outlet channels are kept open and that trash, drift, or debris is not allowed to accumulate near drainage structures. Flap gates and manually operated gates and valves on

drainage structures shall be examined, oiled, and trial operated at least once every 90 days. Where drainage structures are provided with stop log or other emergency closures, the condition of the equipment and its housing shall be inspected regularly and a trial installation of the emergency closure shall be made at least once each year. Periodic inspections shall be made by the Superintendent to be certain that:

(i) Pipes, gates, operating mechanism, riprap, and headwalls are in good condition;

(ii) Inlet and outlet channels are open;

(iii) Care is being exercised to prevent the accumulation of trash and debris near the structures and that no fires are being built near bituminous coated pipes;

(iv) Erosion is not occurring adjacent to the structure which might endanger its water tightness or stability.

Immediate steps will be taken to repair damage, replace missing or broken parts, or remedy adverse conditions disclosed by such inspections.

(2) *Operation.* Whenever high water conditions impend, all gates will be inspected a short time before water reaches the invert of the pipe and any object which might prevent closure of the gate shall be removed. Automatic gates shall be closely observed until it has been ascertained that they are securely closed. Manually operated gates and valves shall be closed as necessary to prevent inflow of flood water. All drainage structures in levees shall be inspected frequently during floods to ascertain whether seepage is taking place along the lines of their contact with the embankment. Immediate steps shall be taken to correct any adverse condition.

(c) *Closure structures—(1) Maintenance.* Closure structures for traffic openings shall be inspected by the superintendent every 90 days to be certain that:

(i) No parts are missing;

(ii) Metal parts are adequately covered with paint;

(iii) All movable parts are in satisfactory working order,

(iv) Proper closure can be made promptly when necessary;

(v) Sufficient materials are on hand for the erection of sand bag closures and that the location of such materials will be readily accessible in times of emergency.

Tools and parts shall not be removed for other use. Trial erections of one or more closure structures shall be made once each year, alternating the structures chosen so that each gate will be erected at least once in each 3-year period. Trial erection of all closure structures shall be made whenever a change is made in key operating personnel. Where railroad operation makes trial erection of a closure structure infeasible, rigorous inspection and drill of operating personnel may be substituted therefor. Trial erection of sand bag closures is not required. Closure materials will be carefully checked prior to and following flood periods, and damaged or missing parts shall be repaired or replaced immediately.

(2) *Operation.* Erection of each movable closure shall be started in sufficient time to permit completion before flood waters reach the top of the structure sill. Information regarding the proper method of erecting each individual closure structure, together with an estimate of the time required by an experienced crew to complete its erection will be given

in the Operation and Maintenance Manual which will be furnished local interests upon completion of the project. Closure structures will be inspected frequently during flood periods to ascertain that no undue leakage is occurring and that drains provided to care for ordinary leakage are functioning properly. Boats or floating plant shall not be allowed to tie up to closure structures or to discharge passengers or cargo over them.

(f) *Pumping plants—(1) Maintenance.* Pumping plants shall be inspected by the Superintendent at intervals not to exceed 30 days during flood seasons and 90 days during off-flood seasons to insure that all equipment is in order for instant use. At regular intervals, proper measures shall be taken to provide for cleaning plant, buildings, and equipment, repainting as necessary, and lubricating all machinery. Adequate supplies of lubricants for all types of machines, fuel for gasoline or diesel powered equipment, and flash lights or lanterns for emergency lighting shall be kept on hand at all times. Telephone service shall be maintained at pumping plants. All equipment, including switch gear, transformers, motors, pumps, valves, and gates shall be trial operated and checked at least once every 90 days. Megger tests of all insulation shall be made whenever wiring has been subjected to undue dampness and otherwise at intervals not to exceed one year. A record shall be kept showing the results of such tests. Wiring disclosed to be in an unsatisfactory condition by such tests shall be brought to a satisfactory condition or shall be promptly replaced. Diesel and gasoline engines shall be started at such intervals and allowed to run for such length of time as may be necessary to insure their serviceability in times of emergency. Only skilled electricians and mechanics shall be employed on tests and repairs. Operating personnel for the plant shall be present during tests. Any equipment removed from the station for repair or replacement shall be returned or replaced as soon as practicable and shall be trial operated after reinstallation. Repairs requiring removal of equipment from the plant shall be made during off-flood seasons insofar as practicable.

(2) *Operation.* Competent operators shall be on duty at pumping plants whenever it appears that necessity for pump operation is imminent. The operator shall thoroughly inspect, trial operate, and place in readiness all plant equipment. The operator shall be familiar with the equipment manufacturers' instructions and drawings and with the "Operating Instructions" for each station. The equipment shall be operated in accordance with the above-mentioned "Operating Instructions" and care shall be exercised that proper lubrication is being supplied all equipment, and that no overheating, undue vibration or noise is occurring. Immediately upon final recession of flood waters, the pumping station shall be thoroughly cleaned, pump house sumps flushed, and equipment thoroughly inspected, oiled and greased. A record or log of pumping plant operation shall be kept for each station, a copy of which shall be furnished the District Engineer following each flood.

(g) *Channels and floodways—(1) Maintenance.* Periodic inspections of improved channels and floodways shall be made by the Superintendent to be certain that:

(i) The channel or floodway is clear of debris, weeds, and wild growth;

(ii) The channel or floodway is not being restricted by the depositing of waste materials, building of unauthorized structures or other encroachments;

(iii) The capacity of the channel or floodway is not being reduced by the formation of shoals;

(iv) Banks are not being damaged by rain or wave wash, and that no sloughing of banks has occurred;

(v) Riprap sections and deflection dikes and walls are in good condition;

(vi) Approach and egress channels adjacent to the improved channel or floodway are sufficiently clear of obstructions and debris to permit proper functioning of the project works.

Such inspections shall be made prior to the beginning of the flood season and otherwise at intervals not to exceed 90 days. Immediate steps will be taken to remedy any adverse conditions disclosed by such inspections. Measures will be taken by the Superintendent to promote the growth of grass on bank slopes and earth deflection dikes. The Superintendent shall provide for periodic repair and cleaning of debris basins, check dams, and related structures as may be necessary.

(2) *Operation.* Both banks of the channel shall be patrolled during periods of high water, and measures shall be taken to protect those reaches being attacked by the current or by wave wash. Appropriate measures shall be taken to prevent the formation of jams of ice or debris. Large objects which become lodged against the bank shall be removed. The improved channel or floodway shall be thoroughly inspected immediately following each major high water period. As soon as practicable thereafter, all snags and other debris shall be removed and all damage to banks, riprap, deflection dikes and walls, drainage outlets, or other flood control structures repaired.

(h) *Miscellaneous facilities—(1) Maintenance.* Miscellaneous structures and facilities constructed as a part of the protective works and other structures and facilities which function as a part of, or affect the efficient functioning of the protective works, shall be periodically inspected by the Superintendent and appropriate maintenance measures taken. Damaged or unserviceable parts shall be repaired or replaced without delay. Areas used for ponding in connection with pumping plants or for temporary storage of interior run-off during flood periods shall not be allowed to become filled with silt, debris, or dumped material. The Superintendent shall take proper steps to prevent restriction of bridge openings and, where practicable, shall provide for temporary raising during floods of bridges which restrict channel capacities during high flows.

(2) *Operation.* Miscellaneous facilities shall be operated to prevent or reduce flooding during periods of high water. Those facilities constructed as a part of the protective works shall not be used for purposes other than flood protection without approval of the District Engineer unless designed therefor. (49 Stat. 1571, 50 Stat. 877; and 56 Stat. 638; 33 U.S.C. 701c; 701c-1) (Regs. 9 August 1944, CE SPEWF)

[SEAL]

J. A. ULIO,  
Major General,  
The Adjutant General.

[F. R. Doc. 44-12285; Filed, August 16, 1944;  
9:44 a. m.]

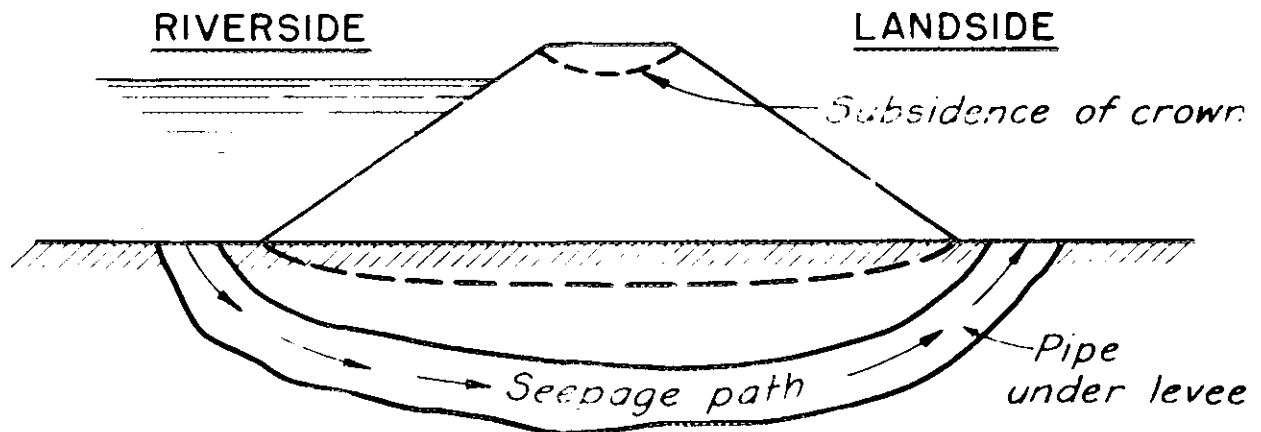


APPENDIX D

FLOOD EMERGENCY MEASURES

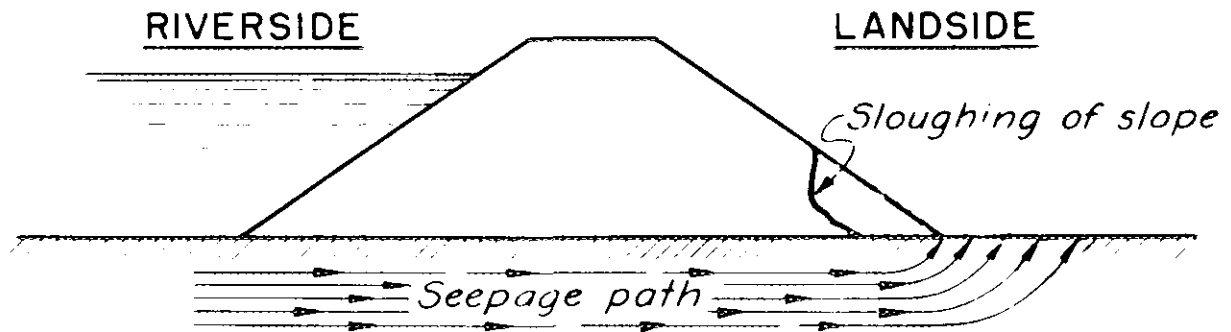
<u>Plate No.</u>	<u>Title</u>
I	Effect of Sand Boils
II	Sand Boil
III	Sacking Sloughs
IV	Sack Dike or Topping
V	Model Sack Dike or Topping
VI	Lumber and Sack Topping
VII	Flashboards

# EFFECTS OF SAND BOILS ON LEVEE



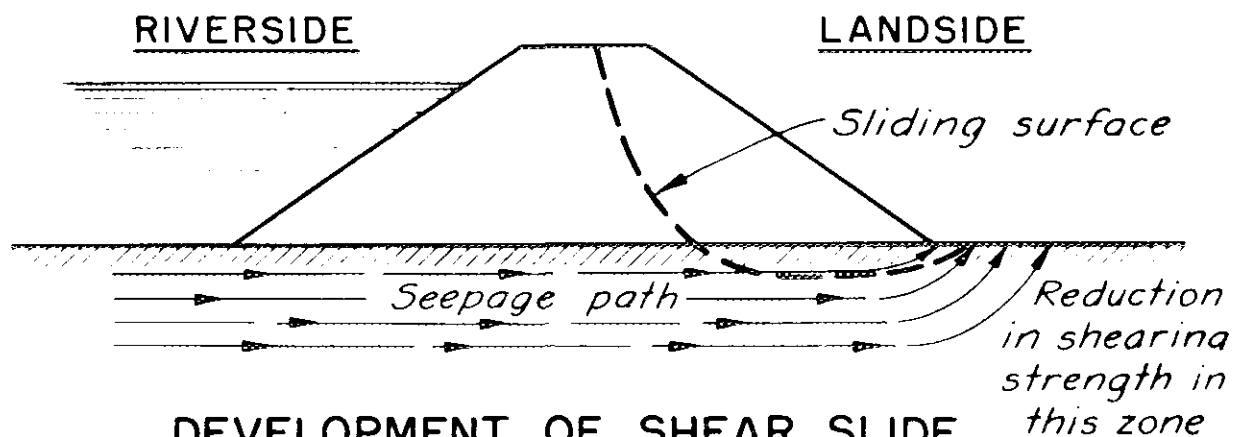
## DEVELOPMENT OF PIPE UNDER LEVEE

Fig. 1



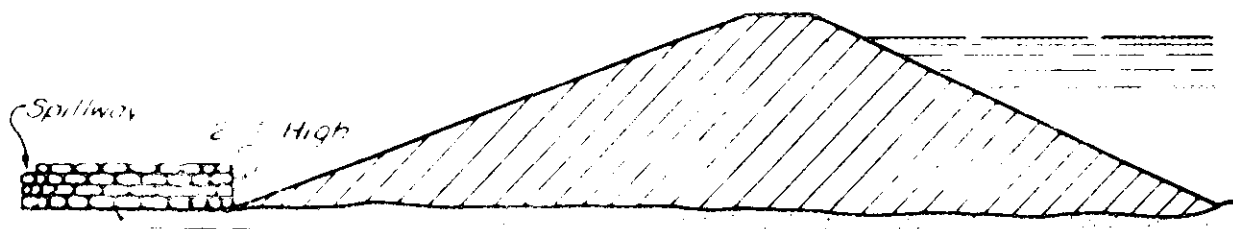
## SLOUGHING OF LANDSLIDE SLOPE DUE TO RAVELLING AND UNDERCUTTING OF TOE

Fig. 2

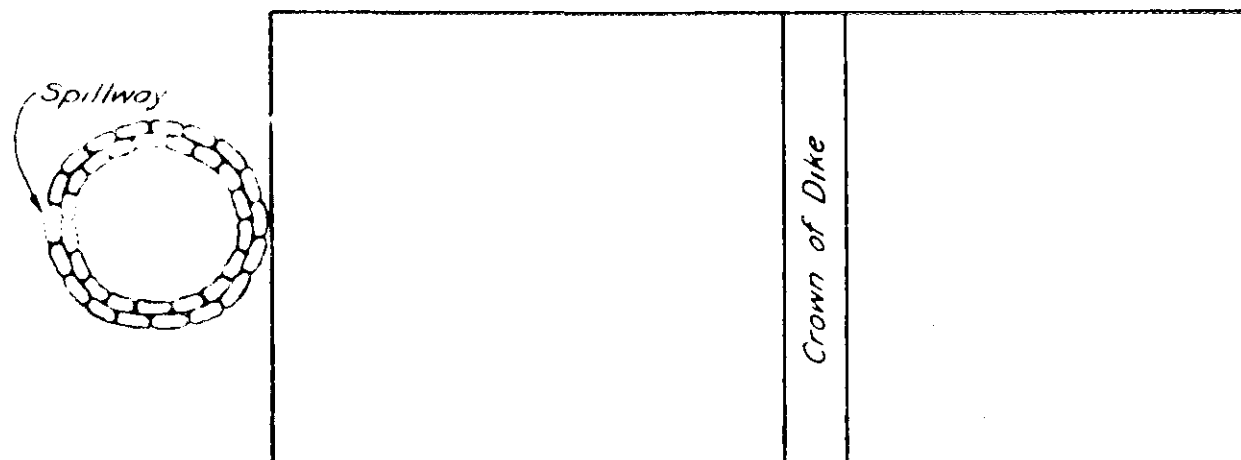


## DEVELOPMENT OF SHEAR SLIDE

Fig. 3



Wall should be built on firm ELEVATION  
 foundation, with width of base  
 at least  $1\frac{1}{2}$  times the height.  
 Be sure to place sacks on ground  
 clear of sand discharge.  
 Tie into dike if boil is near toe.

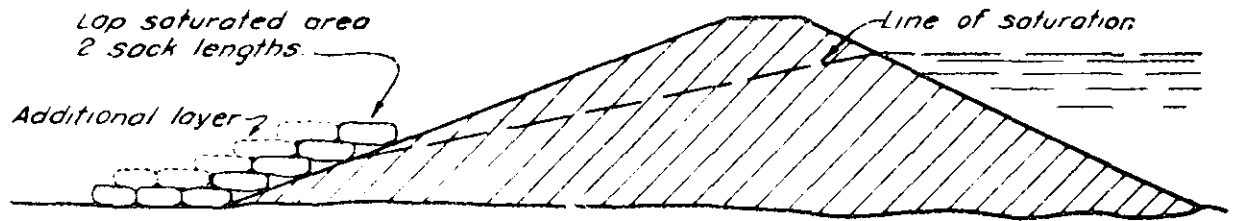


PLAN

Do not sack boil which  
 does not put out material.  
 Height of sack loop or ring  
 should be only sufficient to  
 create enough head to slow  
 down flow through boil so  
 that no more material is dis-  
 placed and boil runs clear.  
 Do not try to stop fully, flow  
 through boil.

**SAND BOIL  
 STANDARD HIGH WATER  
 MAINTENANCE INSTRUCTION**

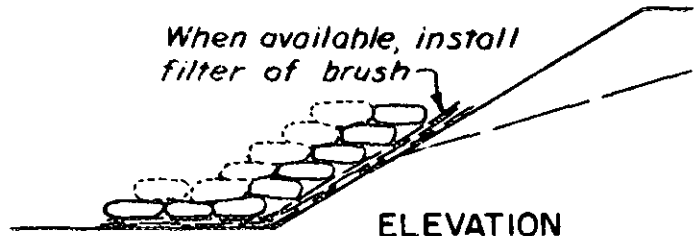
DEPARTMENT OF THE ARMY  
 NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
 WALTHAM, MASS



ELEVATION

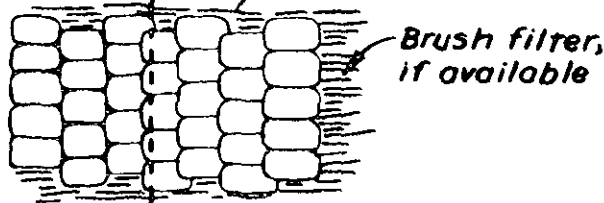
*Number of layers determined by velocity of seepage and amount of material being carried*

*When available, install filter of brush*



ELEVATION

*Lap saturated area 2 sack widths on both ends.*



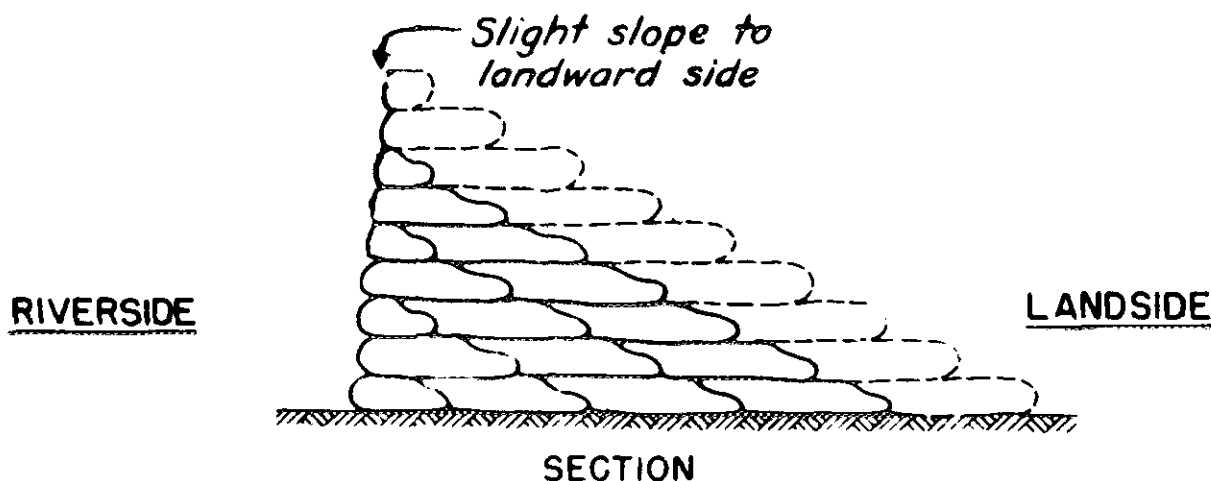
*Crown of Dike*

PLAN

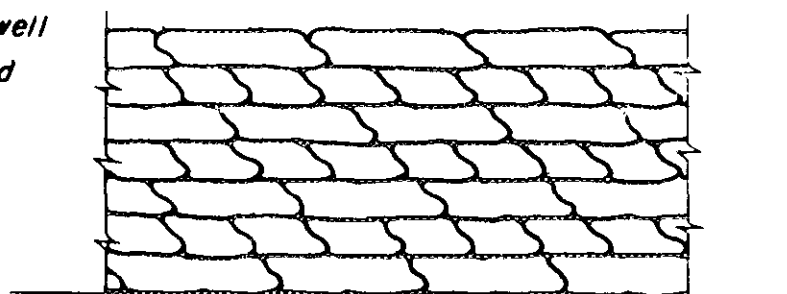
*Sacks should be laid shingle fashion and not matted into place.*

## SACKING SLOUGHS STANDARD HIGH WATER MAINTENANCE INSTRUCTION

DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS.



*Note: Sacks should be lapped at least 1/3 all ways and well mauled or tamped into place.*



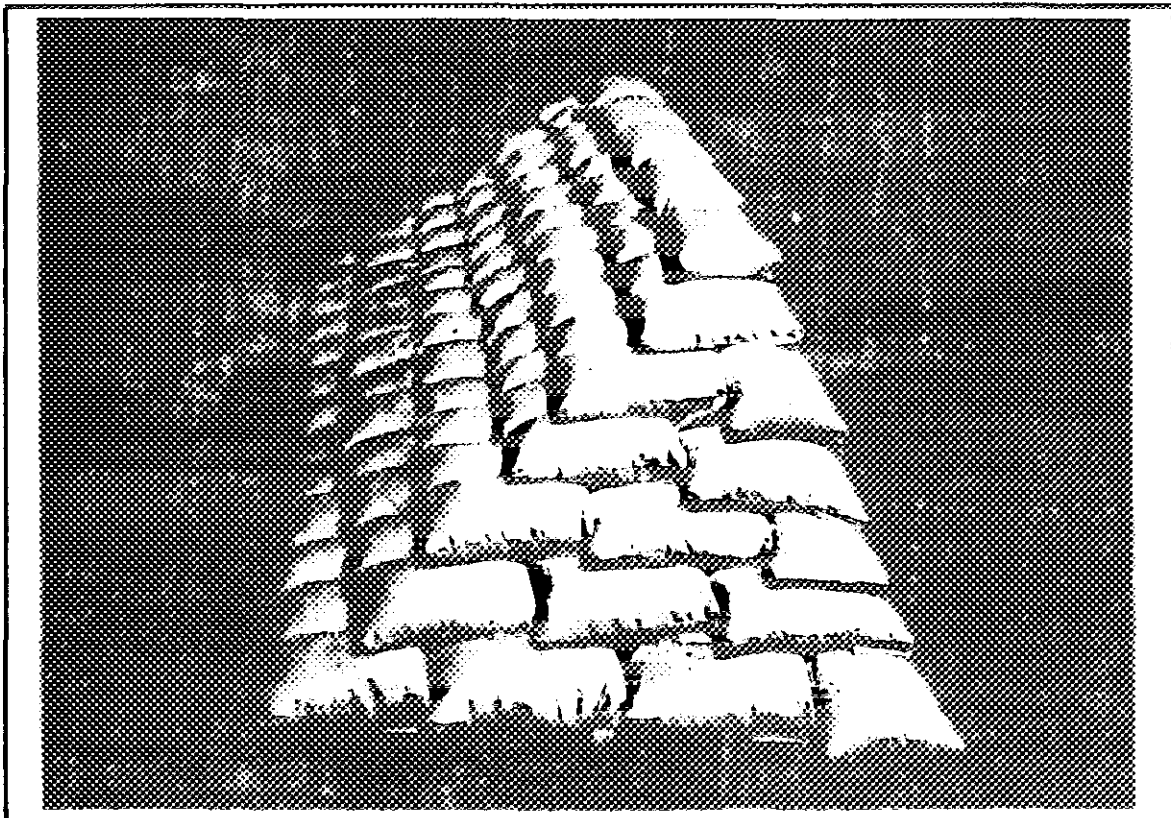
### RIVERSIDE ELEVATION

SACKS REQUIRED PER 100' STA.  
100 lb. "Feed" Sacks - 1 Cu. Ft. Each

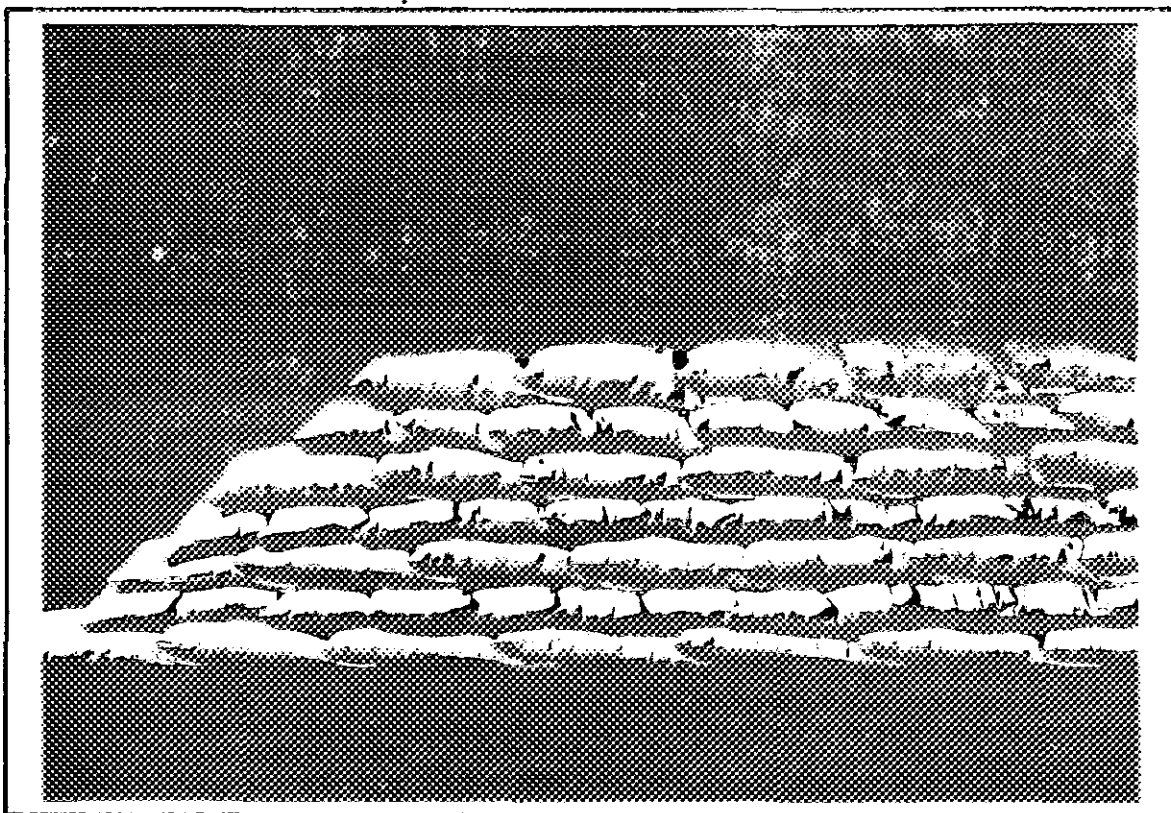
Approx. Hgt. Sack Dike	Sacks High	Required
1.5	3	300
2.0	4	750
3.0	6	1400
4.0	8	2250
5.0	10	3250
6.0	12	4500
7.0	14	5950
8.0	16	7600

### SACK DIKE OR TOPPING STANDARD HIGH WATER MAINTENANCE INSTRUCTION

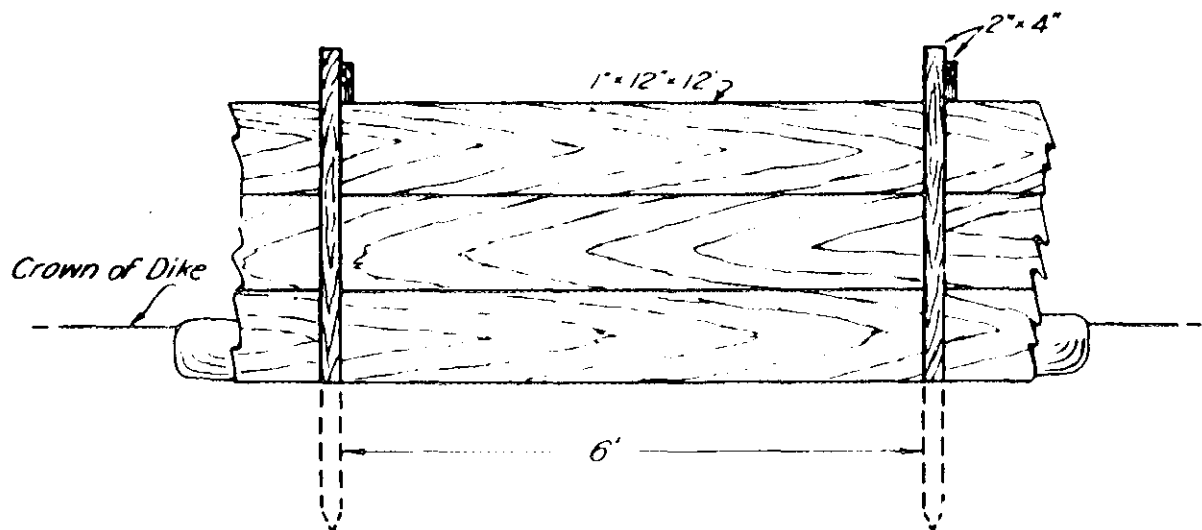
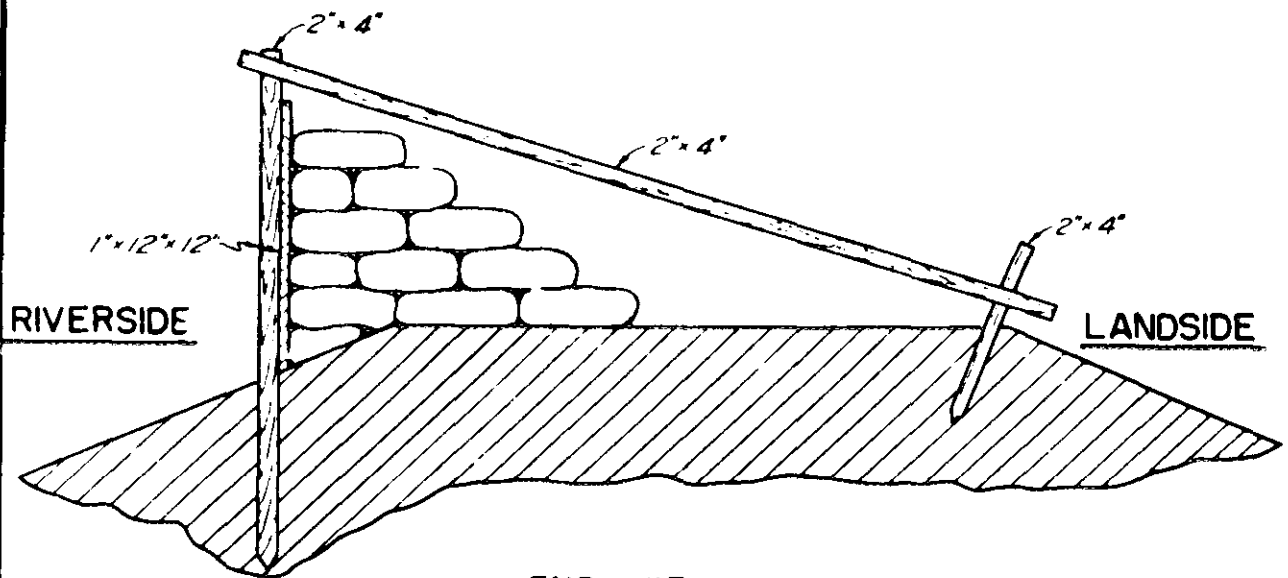
DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS.



MODEL SACK DIKE OR TOPPING  
Typical Section



MODEL SACK DIKE OR TOPPING  
Riverside View



### BILL OF MATERIAL TO CONSTRUCT 100 FEET

25 pcs. 1" x 12" x 12'

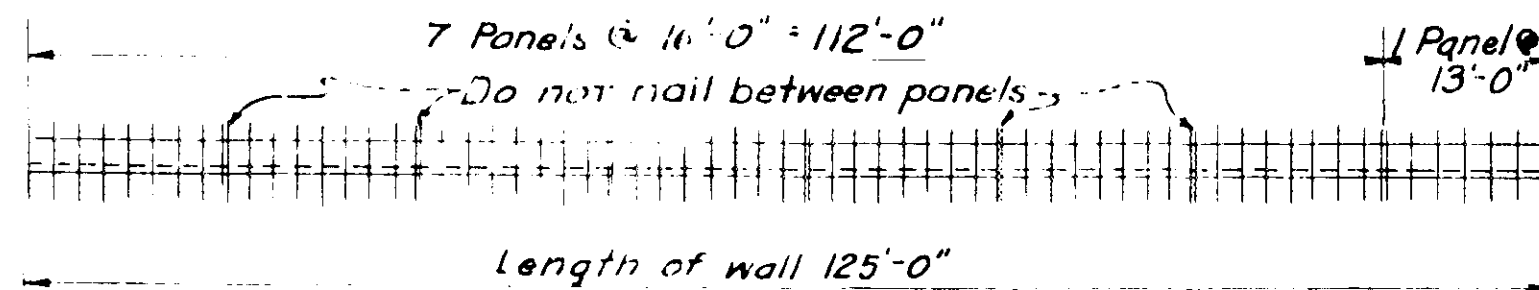
17 pcs. 2" x 4" x 6'

17 pcs. 2" x 4" x 10'

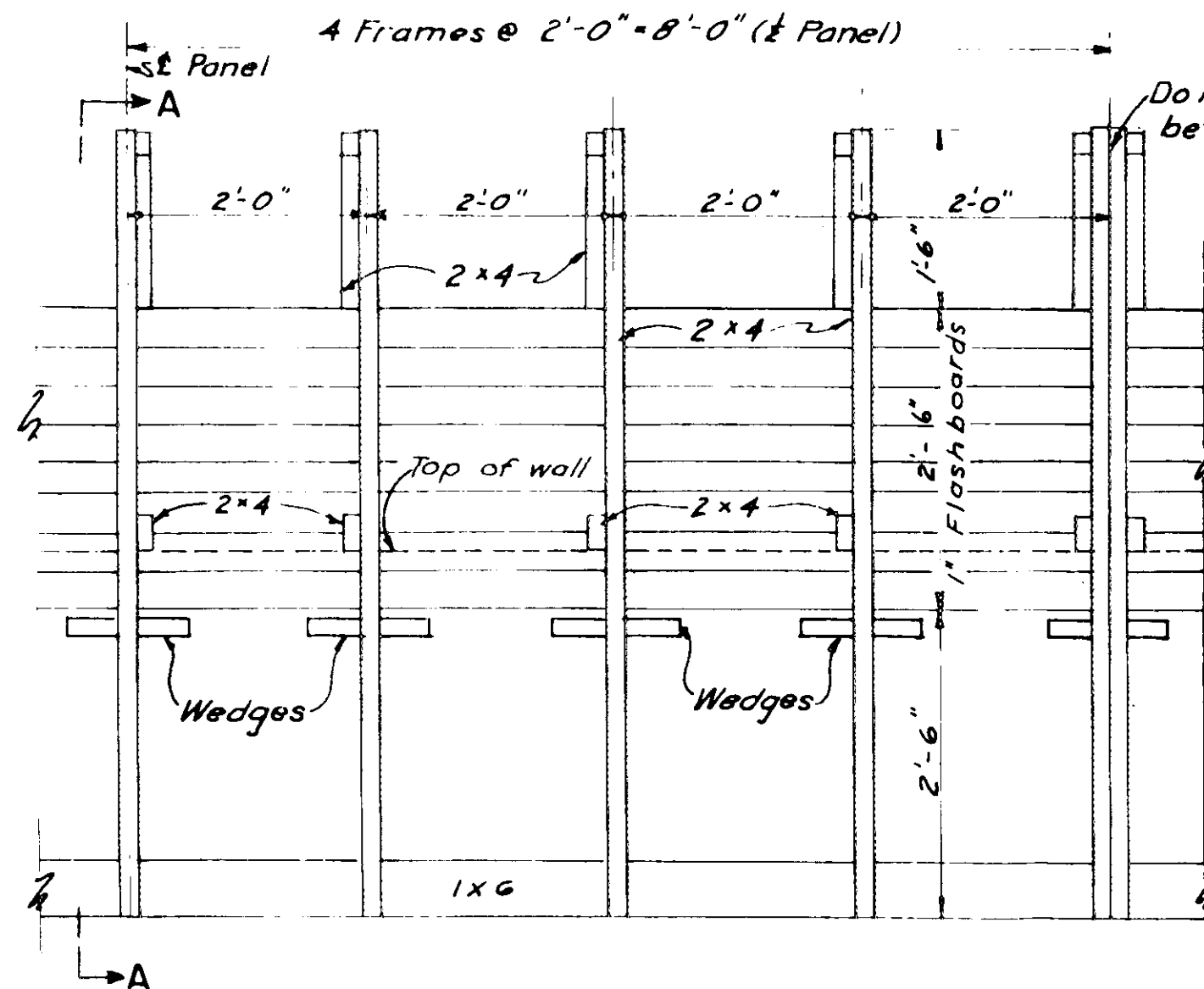
17 pcs. 2" x 4" x 2'

### LUMBER AND SACK TOPPING STANDARD HIGH WATER MAINTENANCE INSTRUCTION

DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS.



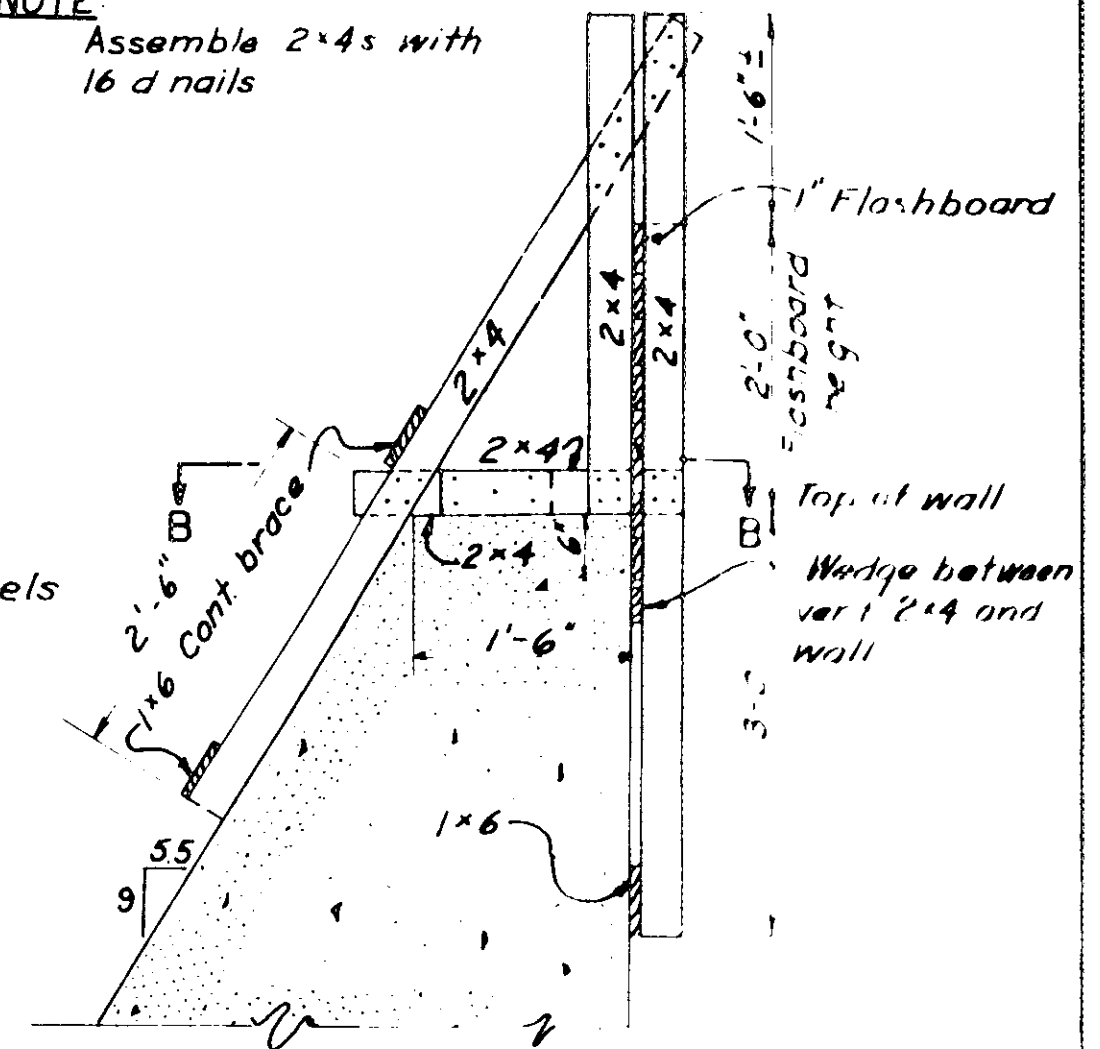
**ELEVATION OF FLASHBOARDS**  
SCALE: 1/16" = 1'-0"



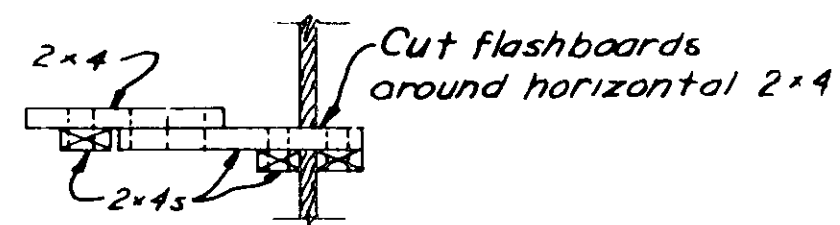
**DETAIL ELEVATION OF FLASHBOARD FRAMES**  
SCALE: 3/4" = 1'-0"

**NOTE:**

Assemble 2x4s with  
16 d nails



**SECTION A-A**  
SCALE: 3/4" = 1'-0"



**SECTION B-B**  
SCALE: 3/4" = 1'-0"

**FLOOD EMERGENCY  
MEASURES**

**FLASHBOARDS**



APPENDIX E

PLANS

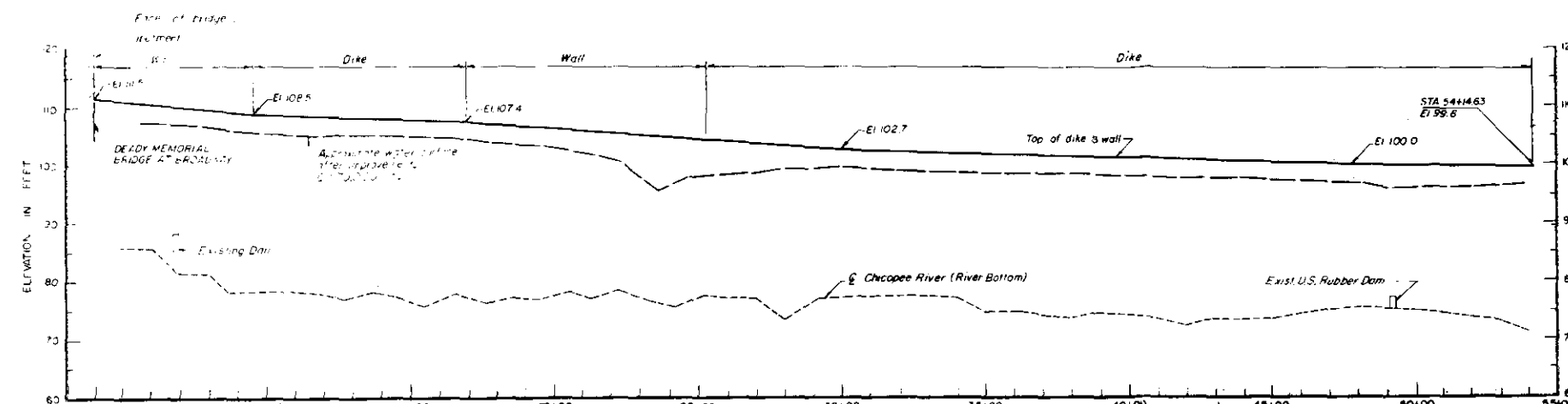
LIST OF PLATES

<u>Plate No.</u>	<u>Sheet No.</u>	<u>Description</u>
E-1	2	General Plan
E-2	4	Plan and Profile - Sta. 4+13 to Sta. 9+23
E-3	5	Plan and Profile - Sta. 9+23 to Sta. 13+97
E-4	6	Plan and Profile - Sta. 13+97 to Sta. 18+60
E-5	7	Plan and Profile - Sta. 18+60 to Sta. 23+40
E-6	8	Plan and Profile - Sta. 23+40 to Sta. 28+23
E-7	9	Plan and Profile - Sta. 28+23 to Sta. 33+17
E-8	10	Plan - Sta. 33+17 to Sta. 37+21
E-9	11	Plan - Sta. 37+21 to Sta. 41+25
E-10	12	Plan - Sta. 41+25 to Sta. 45+45
E-11	13	Plan - Sta. 45+45 to Sta. 49+61
E-12	14	Plan - Sta. 49+61 to Sta. 54+14.63
E-13	15	Channel Improvement - Plan No. 1
E-14	16	Channel Improvement - Plan No. 2
E-15	17	Profiles - Sta. 33+17 to Sta. 54+14.63
E-16	18	Upstream Pressure Drain - Plan and Profile - Sta. 0+00 to Sta. 4+80
E-17	19	Upstream Pressure Drain - Plan and Profile - Sta. 4+80 to Sta. 10+60
E-18	20	Upstream Pressure Drain - Plan and Profile - Sta. 10+60 to Sta. 16+35

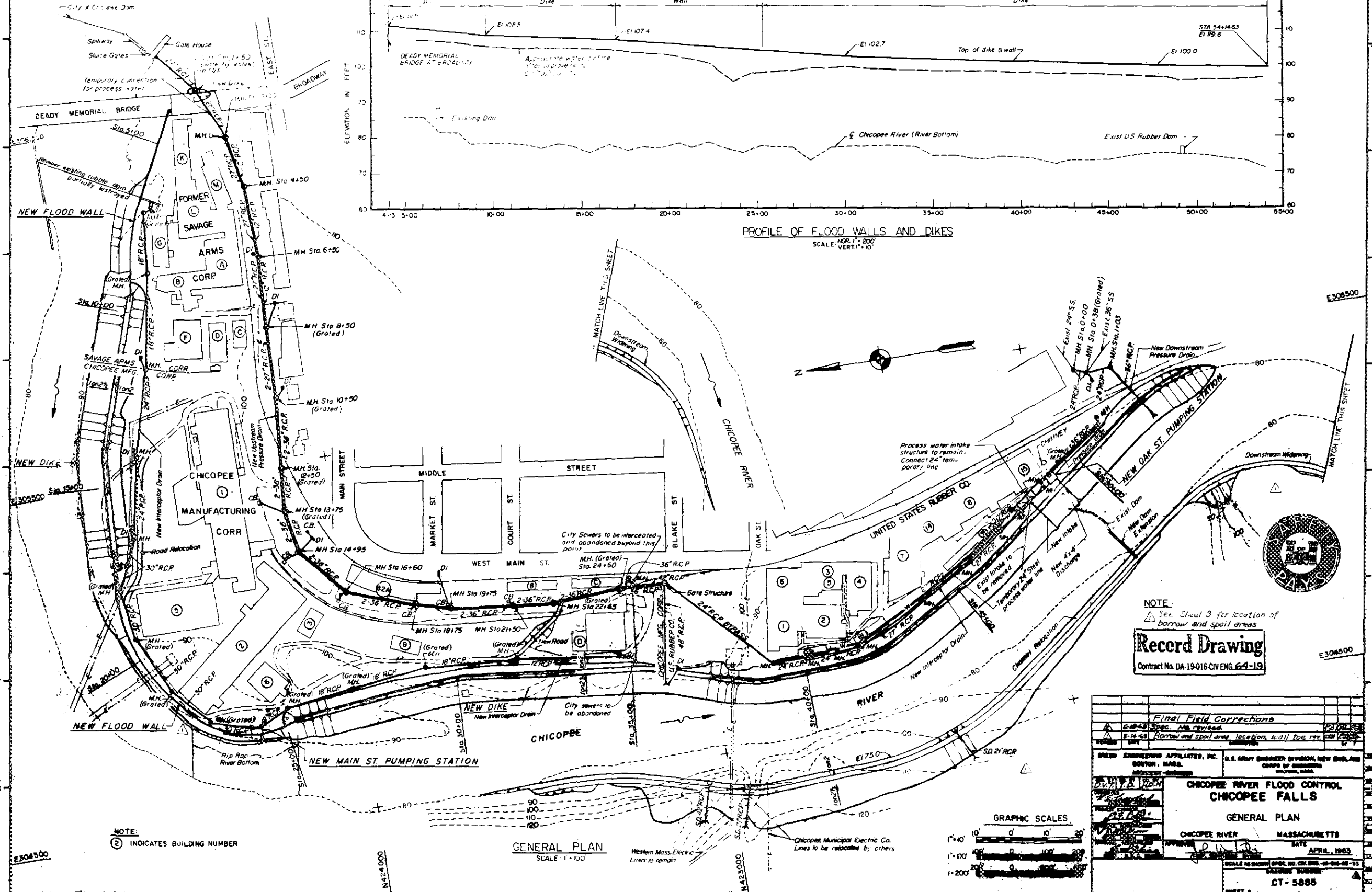
<u>Plate No.</u>	<u>Sheet No.</u>	<u>Description</u>
E-19	21	Upstream Pressure Drain - Plan and Profile - Sta. 16+35 to Sta. 22+16
E-20	22	Upstream Pressure Drain - Plan and Profile - Sta. 22+16 to Outlet
E-21	23	Drainage Plan
E-22	24	Downstream Pressure Drain - Plan and Profile - Sta. 0+00 to Outlet
E-23	25	Typical Sections No. 1 - Dike
E-24	26	Typical Sections No. 2 - Dike
E-25	27	Miscellaneous Details
E-26	28	Typical Sections No. 1 - Flood Walls
E-27	29	Typical Sections No. 2 - Flood Walls
E-28	30	Typical Sections No. 3 - Flood Walls
E-29	31	Typical Details - Flood Walls
E-30	32	Manhole Details No. 1
E-31	33	Manhole Details No. 2
E-32	34	Manhole Details No. 3
E-33	35	Intake Conduit and Chamber Details
E-34	36	Miscellaneous Details - Conduits, Collector Boxes, and Drop Inlets
E-35	37	Gate Structure Details No. 1
E-36	38	Gate Structure Details No. 2
E-37	39	Headwalls and Dam Extension
E-38	40	Main Street Pumping Station - Architectural - Plans and Section
E-39	41	Main Street Pumping Station - Architectural - Elevations

<u>Plate No.</u>	<u>Sheet No.</u>	<u>Description</u>
E-40	42	Main Street Pumping Station - Structural - Reinforcing Details No. 1
E-41	43	Main Street Pumping Station - Structural - Reinforcing Details No. 2
E-42	44	Main Street Pumping Station - Structural - Reinforcing Details No. 3
E-43	45	Main Street Pumping Station - Mechanical - Plan, Section, and Details
E-44	46	Main Street Pumping Station - Electrical - Plans and Section
E-45	47	Oak Street Pumping Station - Architectural - Plans and Section
E-46	48	Oak Street Pumping Station - Architectural - Elevations
E-47	49	Oak Street Pumping Station - Structural - Reinforcing Details No. 1
E-48	50	Oak Street Pumping Station - Structural - Reinforcing Details No. 2
E-49	51	Oak Street Pumping Station - Structural - Reinforcing Details No. 3
E-50	52	Oak Street Pumping Station - Mechanical - Plan, Sections, and Details
E-51	53	Oak Street Pumping Station - Electrical - Plans and Section
E-52	54	Pumping Stations - Architectural Details
E-53	55	Pumping Stations - Structural Details No. 1
E-54	56	Pumping Stations - Structural Details No. 2
E-55	57	Pumping Stations - Mechanical Details
E-56	58	Hydrographs
E-57	67	River Gate Structures - Details

<u>Plate No.</u>	<u>Sheet No.</u>	<u>Description</u>
E-58	CON-42-1	Main Street Pumping Station - Modifications to Pumps No. 1 & No. 2 and Replacement of Sump Pump
E-59	CON-56-1	Main Street Pumping Station - Water Supply - Plans and Details
E-60	CON-49-1	Main and Oak Streets Pumping Stations - Structural Modifications - Plans, Sections and Details
E-61	SK. No. 132	Exterior Stairs
E-62	CON-29-1	City of Chicopee - Electric Relocations



PROFILE OF FLOOD WALLS AND DIKES  
SCALE: HORIZ. 1" = 200' VERT. 1" = 10'

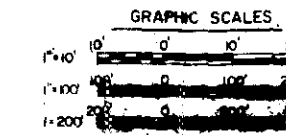


NOTE:  
② INDICATES BUILDING NUMBER

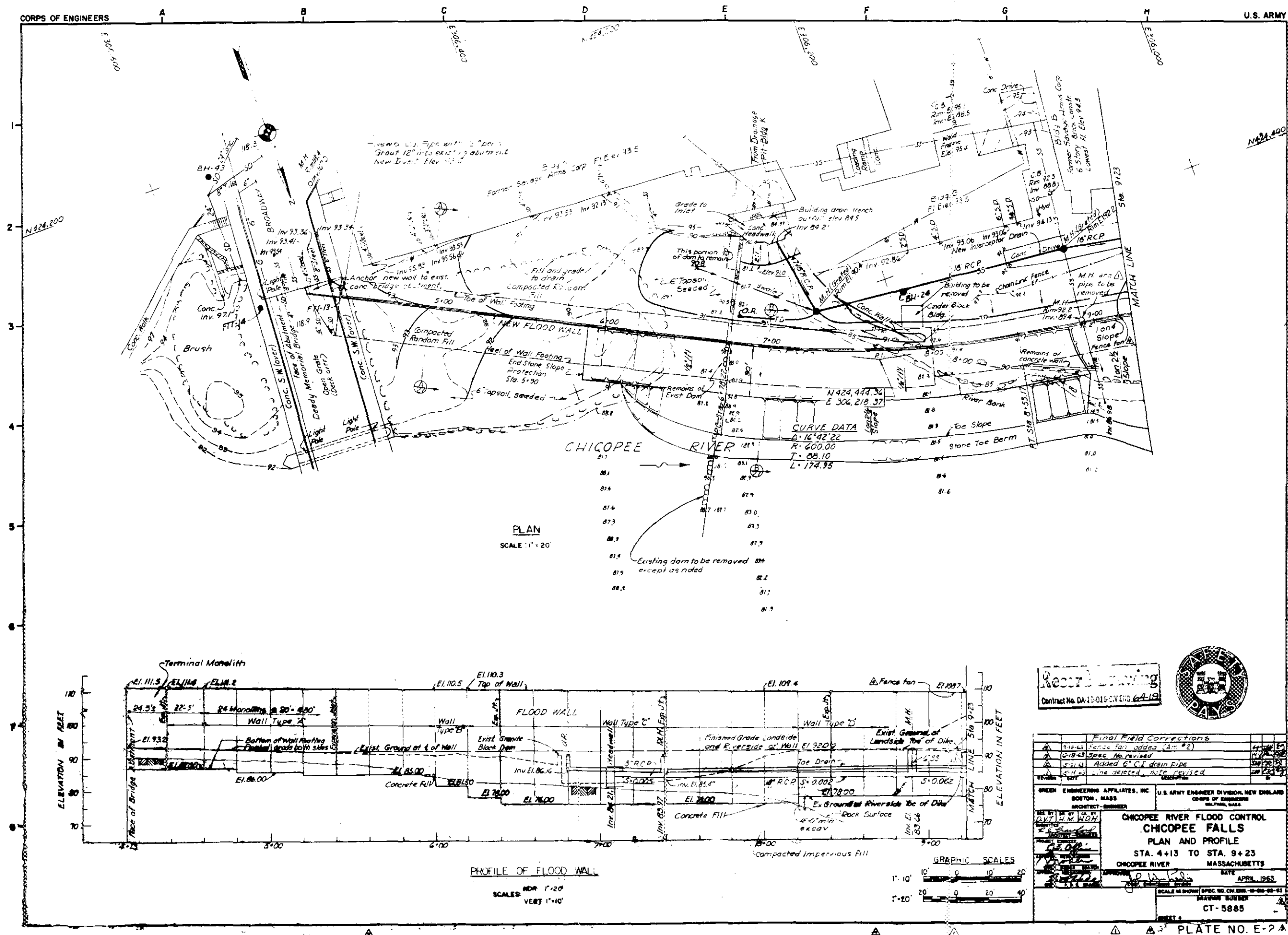
GENERAL PLAN  
SCALE: 1" = 100'

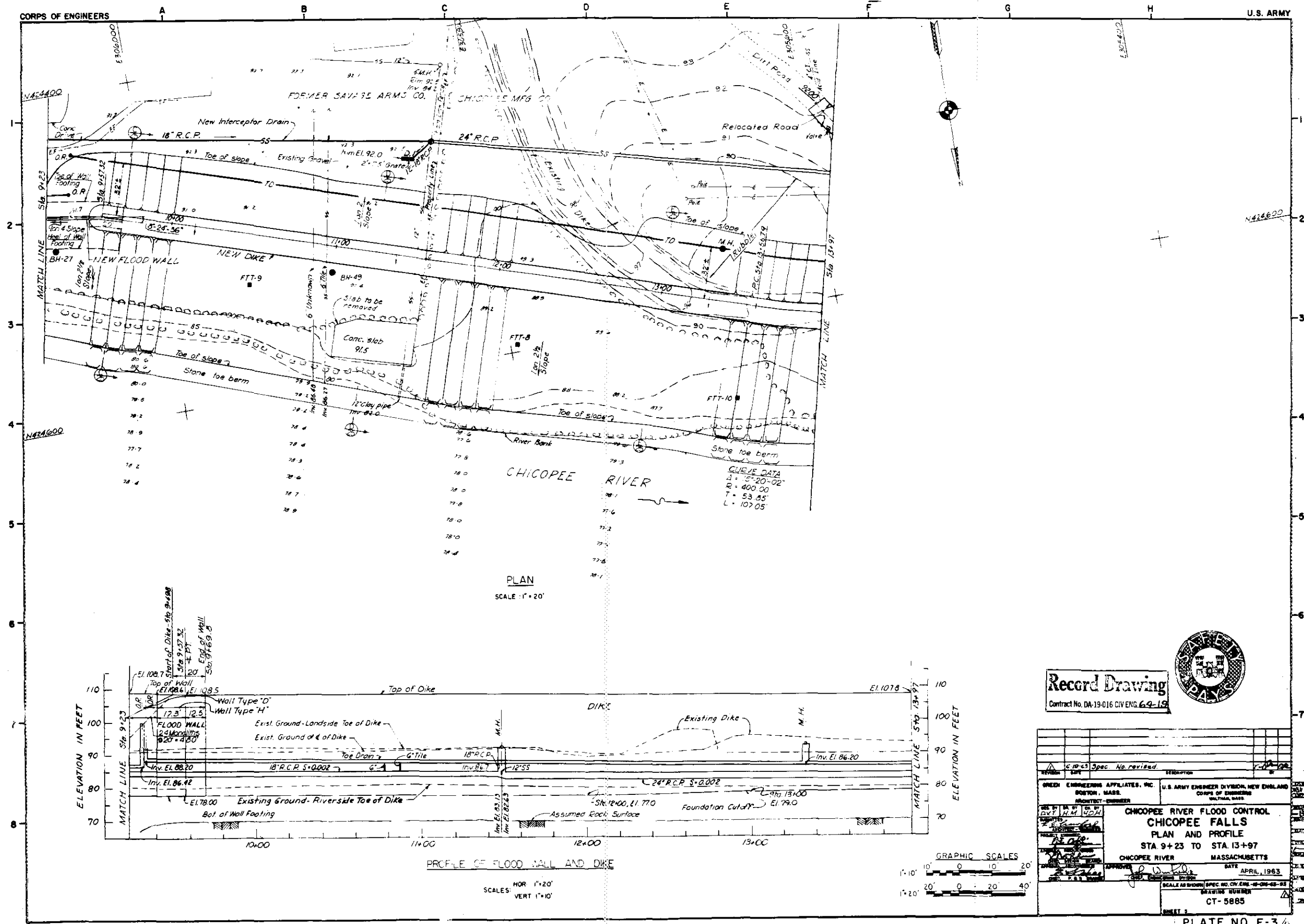
NOTE:  
See Sheet 3 for location of borrow and spoil areas

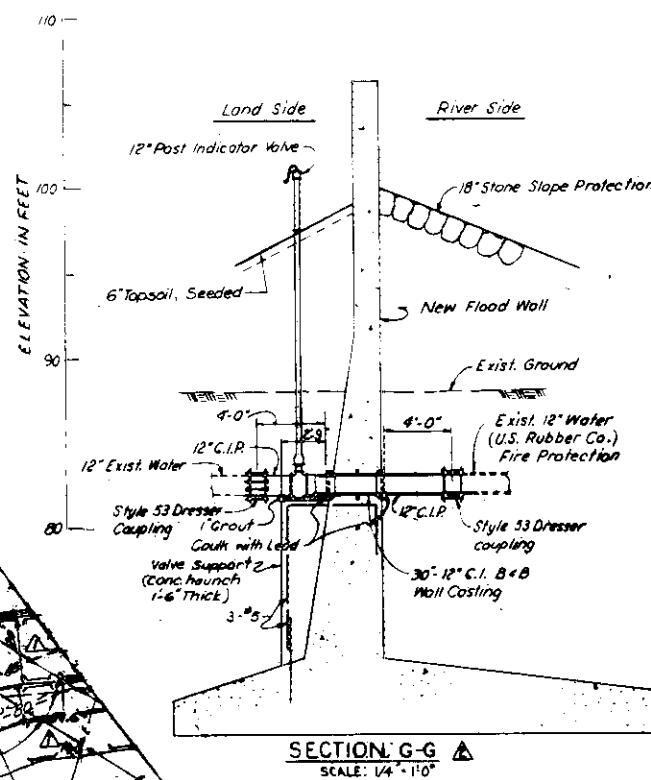
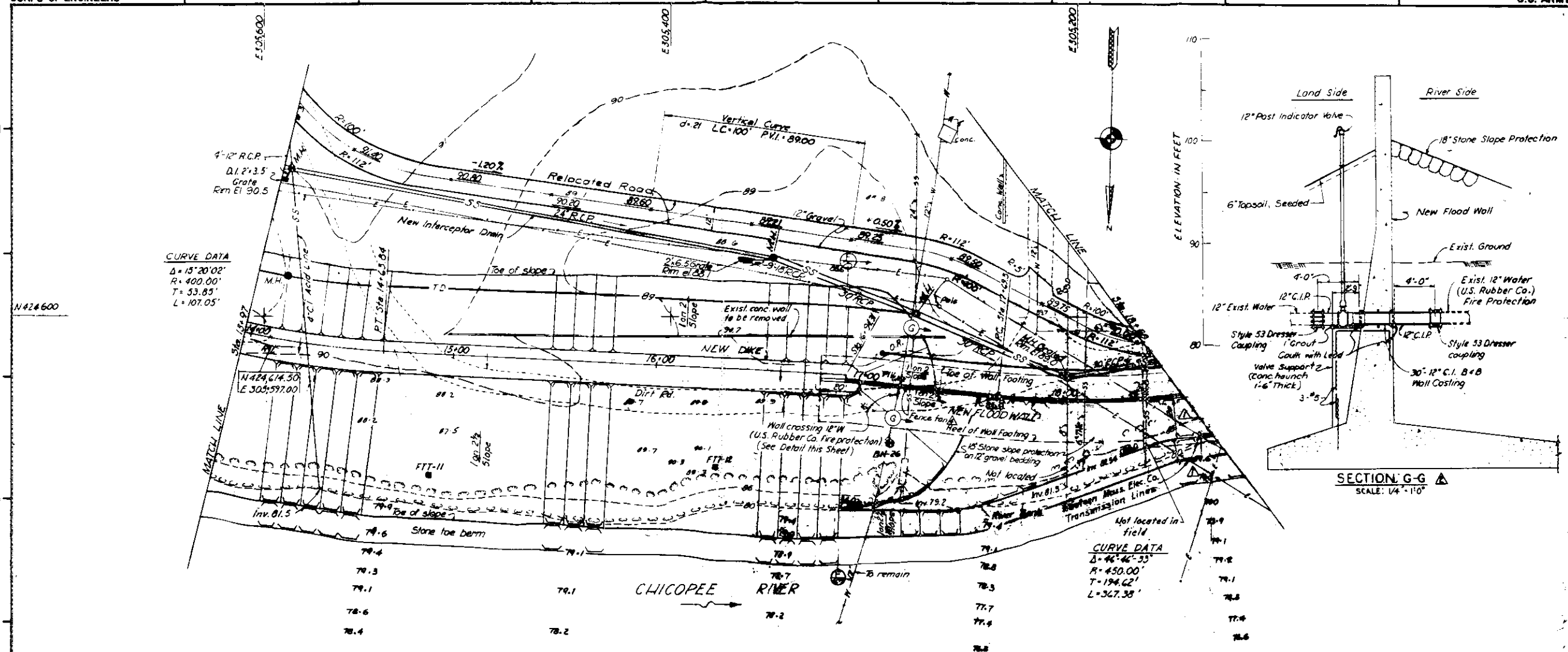
**Record Drawing**  
Contract No. DA-19-016-CV ENG. 64-19



Final Field Corrections	
6-14-53 SPEC. NO. REVISED	PAV
8-14-53 BORROW AND SPOIL AREAS LOCATIONS, ELEV. TOP REV.	PAV
DESIGNED BY: [Signature]	
CHECKED BY: [Signature]	
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND DISTRICT, BOSTON, MASS.	
CHICOPEE RIVER FLOOD CONTROL CHICOPEE FALLS	
GENERAL PLAN	
CHICOPEE RIVER	MASSACHUSETTS
DATE: APRIL, 1953	
SCALE: AS SHOWN (SPEC. NO. CIV. ENG. 64-19-11)	
DRAWING NUMBER: CT-5885	

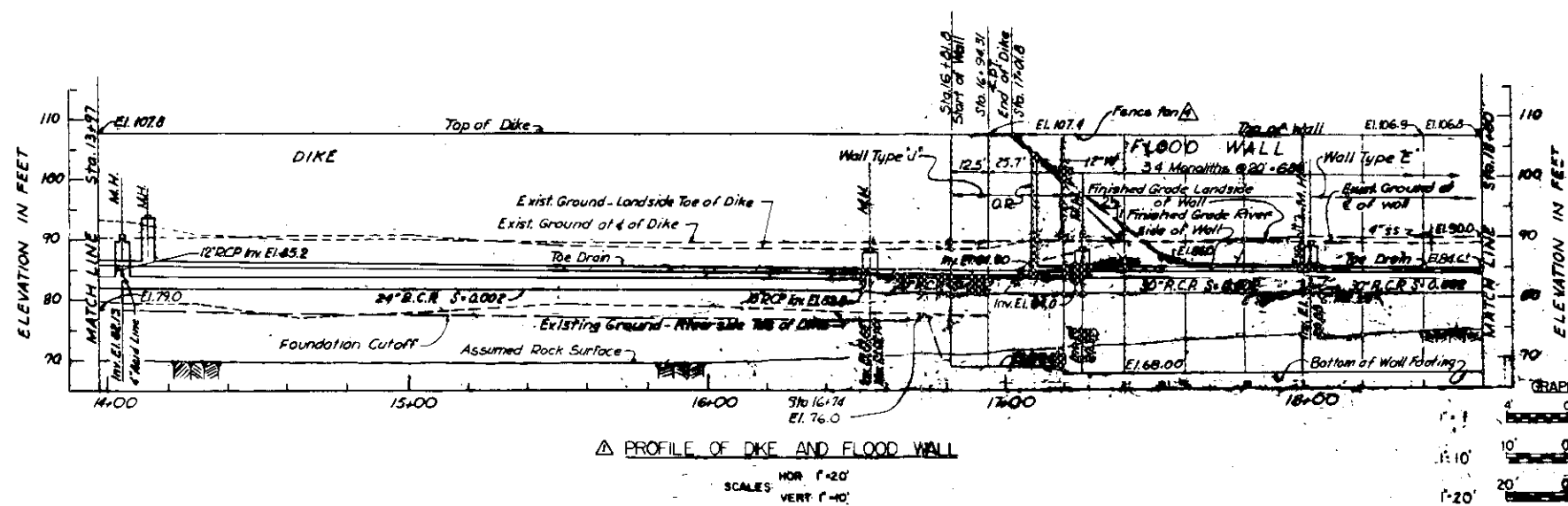






## NOTES:

1. Stone slope protection of wall to extend 10' beyond heel of footing or toe of slope, whichever is further.



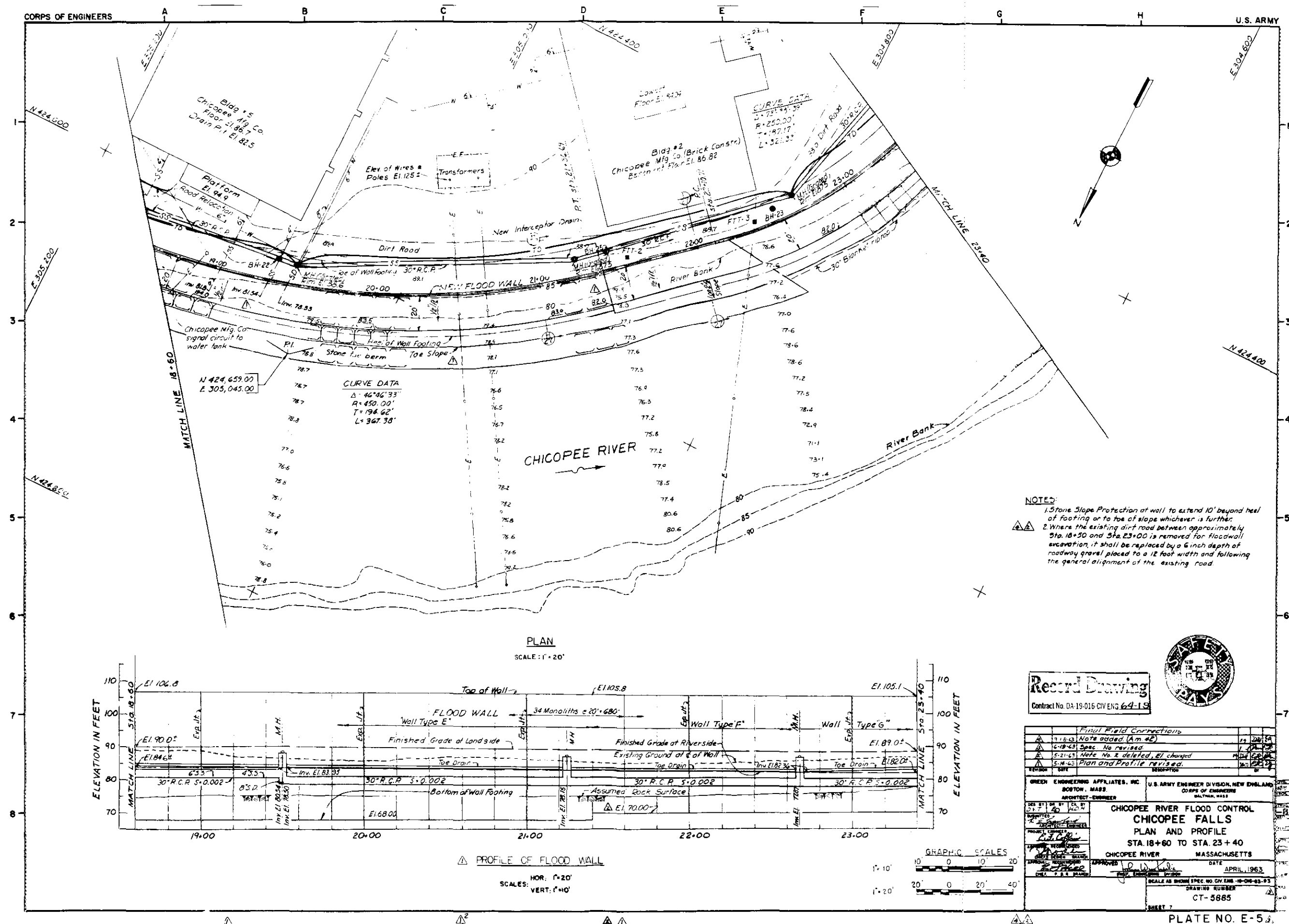
## Record Drawing

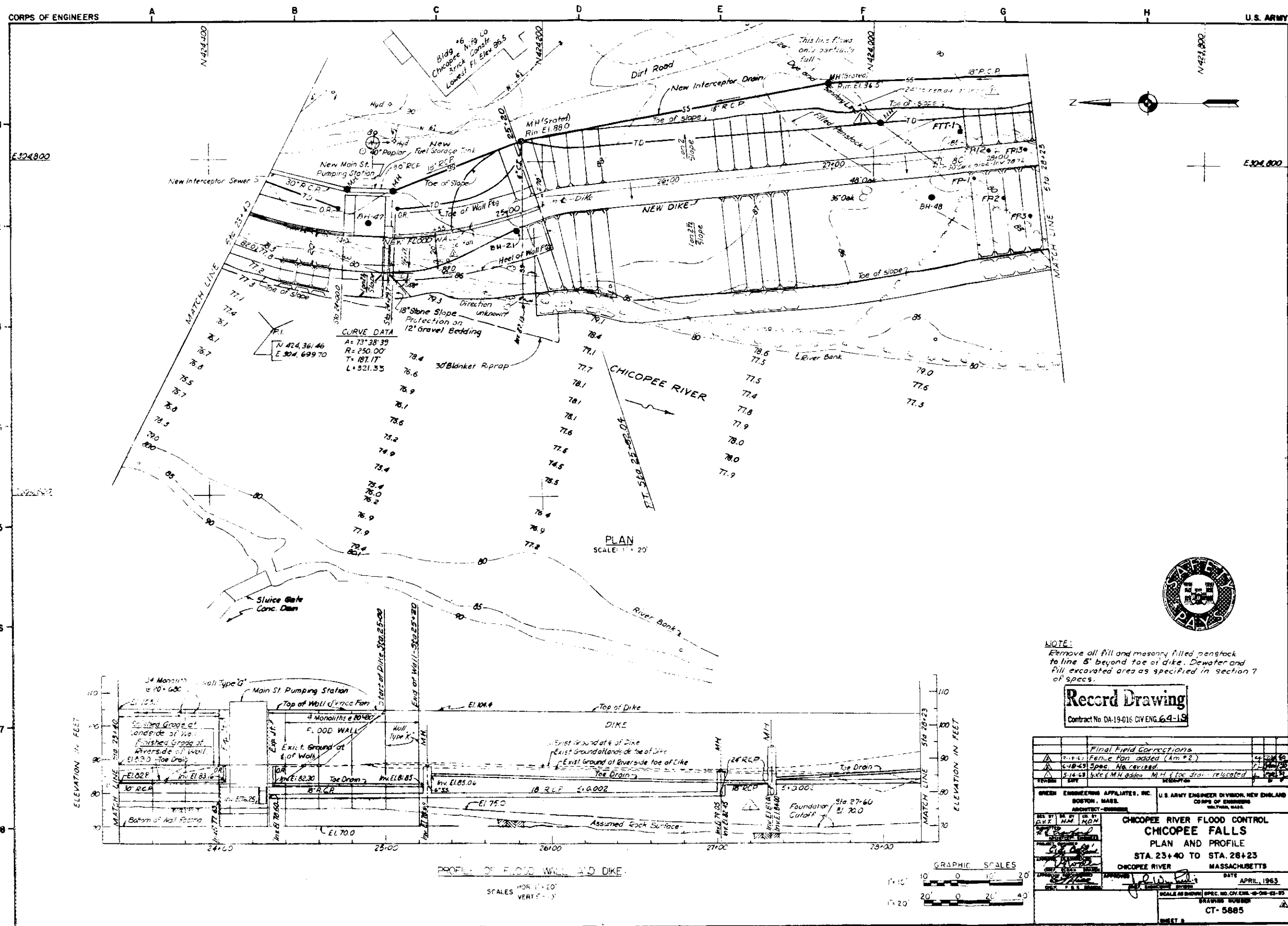
Contract No. DA-19-016-CIV ENG. 6-4-19

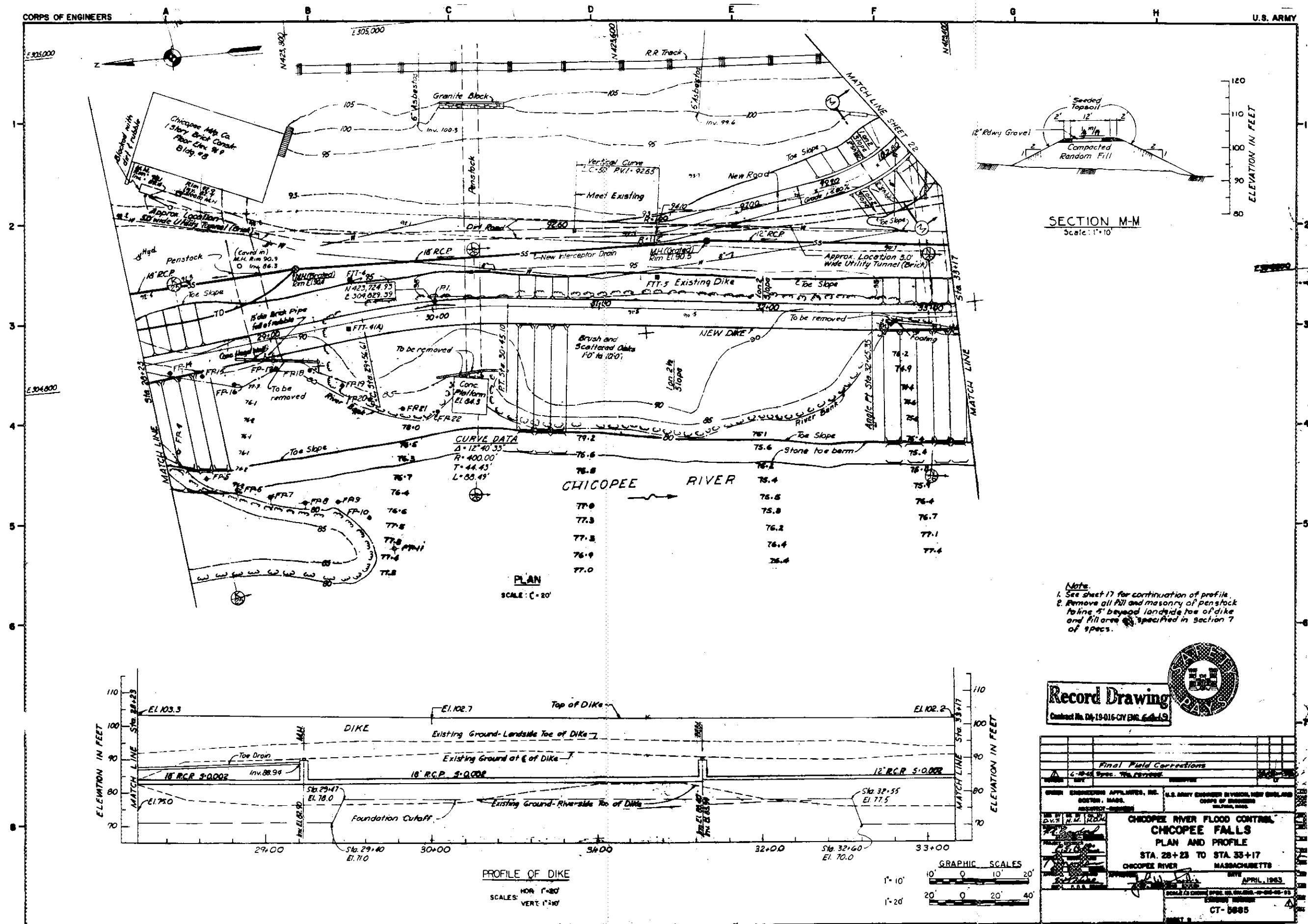
1-18-13	Fence Post	1-18-13	Fence Post
1-18-13	Spec. No. 1015	1-18-13	Spec. No. 1015
1-18-13	Spec. No. 1015	1-18-13	Spec. No. 1015
1-18-13	Spec. No. 1015	1-18-13	Spec. No. 1015
1-18-13	Spec. No. 1015	1-18-13	Spec. No. 1015
1-18-13	Spec. No. 1015	1-18-13	Spec. No. 1015
1-18-13	Spec. No. 1015	1-18-13	Spec. No. 1015
1-18-13	Spec. No. 1015	1-18-13	Spec. No. 1015
1-18-13	Spec. No. 1015	1-18-13	Spec. No. 1015
1-18-13	Spec. No. 1015	1-18-13	Spec. No. 1015

**CHICOPEE RIVER FLOOD CONTROL**  
**CHICOPEE FALLS**  
**PLAN AND PROFILE**  
**STA. 13+97 TO STA. 18+60**  
**CHICOPEE RIVER**  
**MASSACHUSETTS**  
**APRIL, 1963**  
**CT-5886**

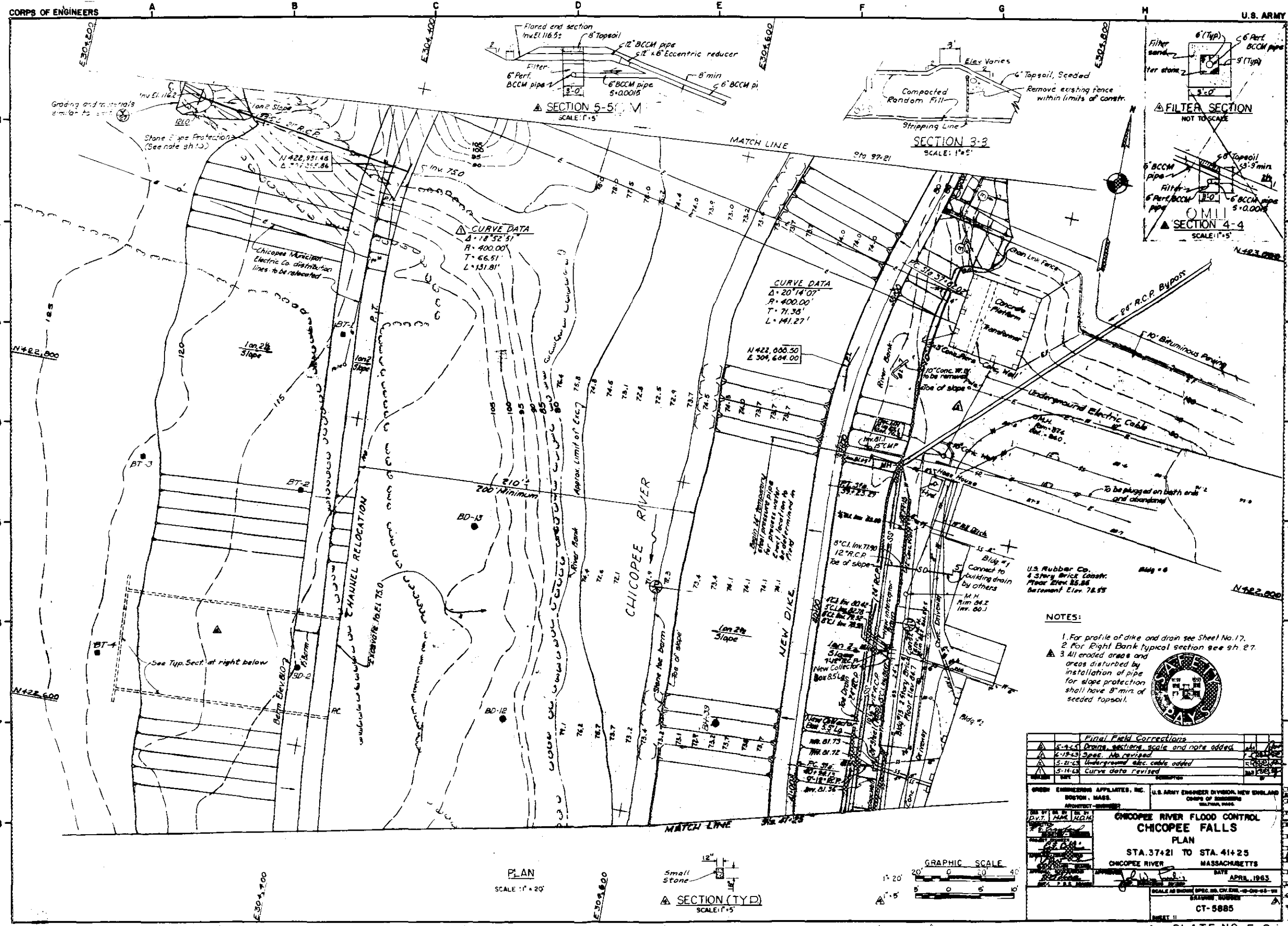












**NOTES:**

1. For profile of dike and drain see Sheet No. 17.
2. For Right Bank typical section see sh. 27.
3. All eroded areas and areas disturbed by installation of pipe for slope protection shall have 8" min. of seeded topsoil.

**Final Field Corrections**

NO.	DESCRIPTION	DATE
5-4-65	Drain sections, scale and note added	4/1/65
5-19-65	Spice. No revised	4/1/65
5-21-65	Underground elec. cable added	5/4/65
5-14-65	Curve data revised	5/14/65

GREEN ENGINEERS APPLICATES, INC.  
BOSTON, MASS.  
PROJECT - CHICOPPEE RIVER FLOOD CONTROL

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND  
CORPS OF ENGINEERS  
BOSTON, MASS.

**CHICOPPEE RIVER FLOOD CONTROL  
CHICOPPEE FALLS  
PLAN**

STA. 37+21 TO STA. 41+25  
CHICOPPEE RIVER  
MASSACHUSETTS

DATE: APRIL 1965  
SCALE: AS SHOWN SPEC. NO. ON EXH. 45-CH-65-11  
DRAWING NUMBER: CT-5885  
SHEET 11

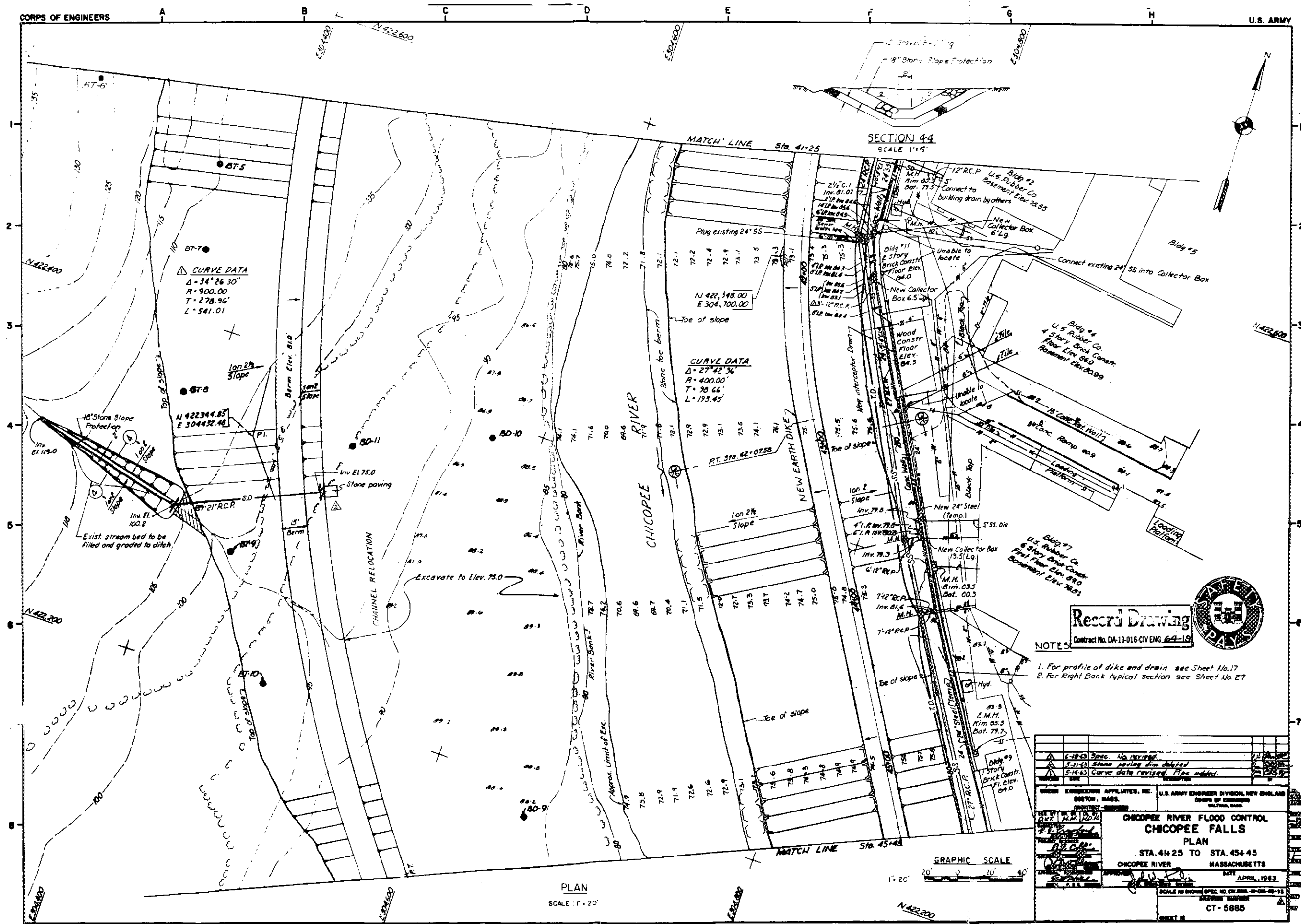
**GRAPHIC SCALE**

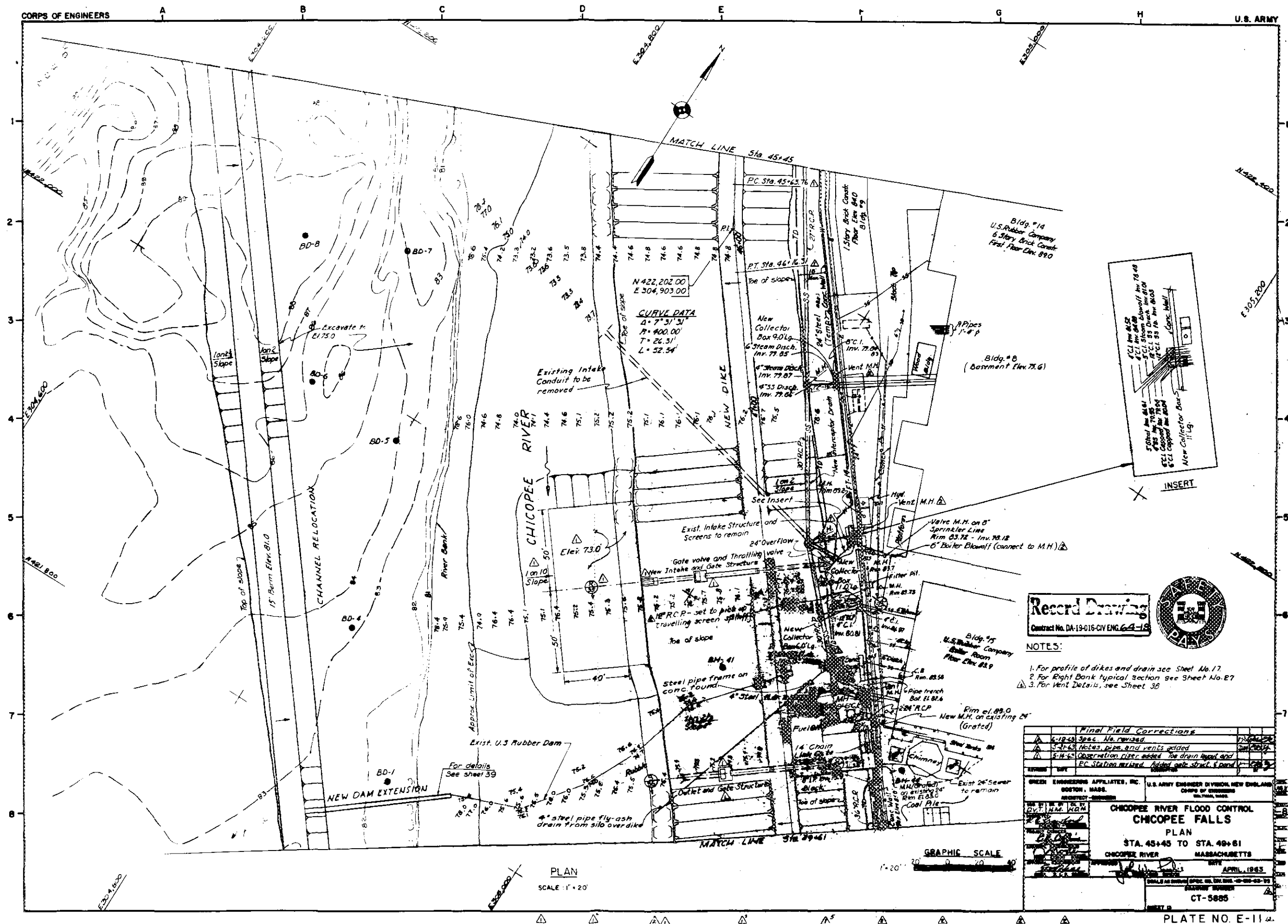
1" = 20'  
0' 20' 40'

**PLAN**  
SCALE: 1" = 20'

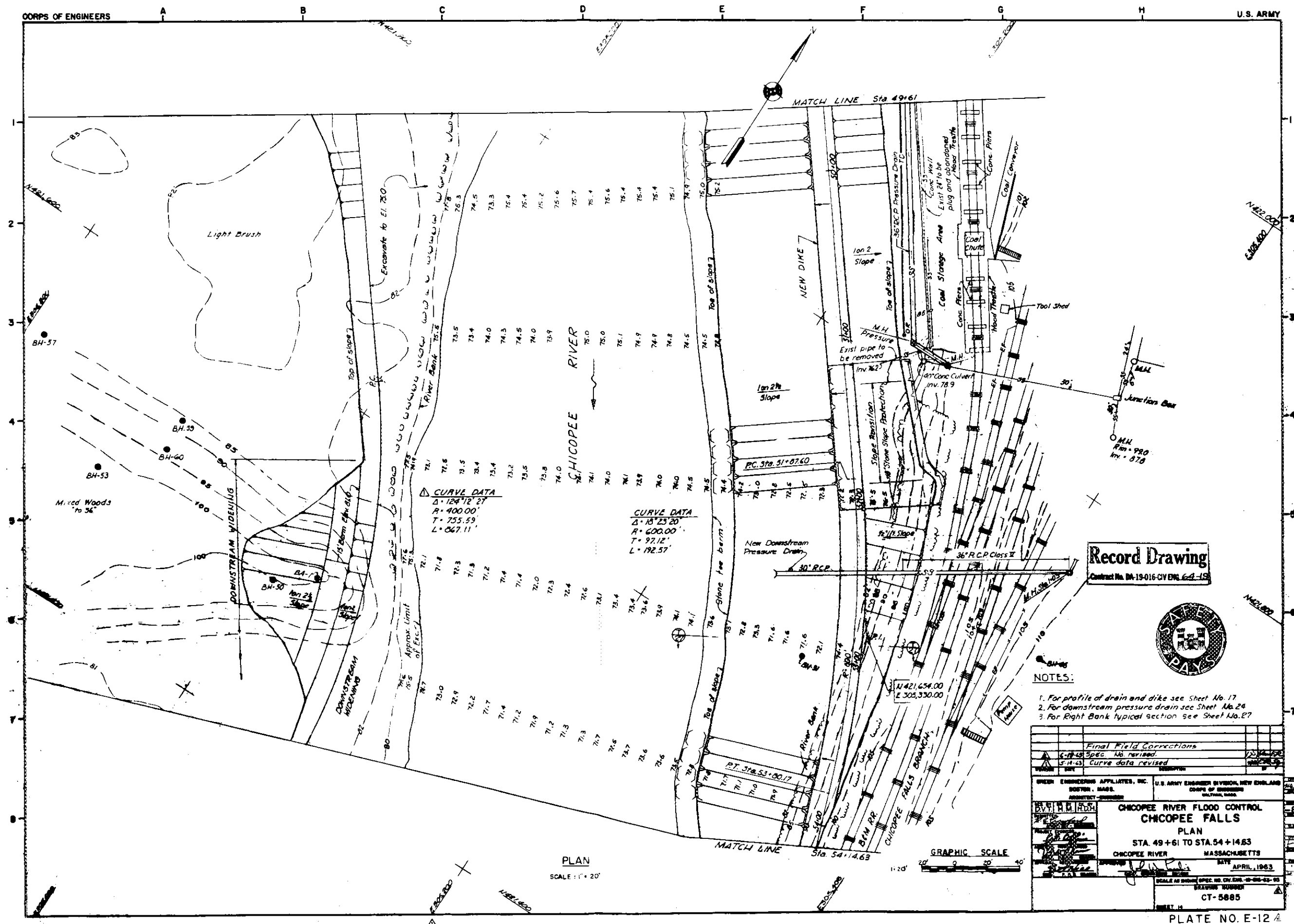
**SECTION (TY D)**  
SCALE: 1" = 5'



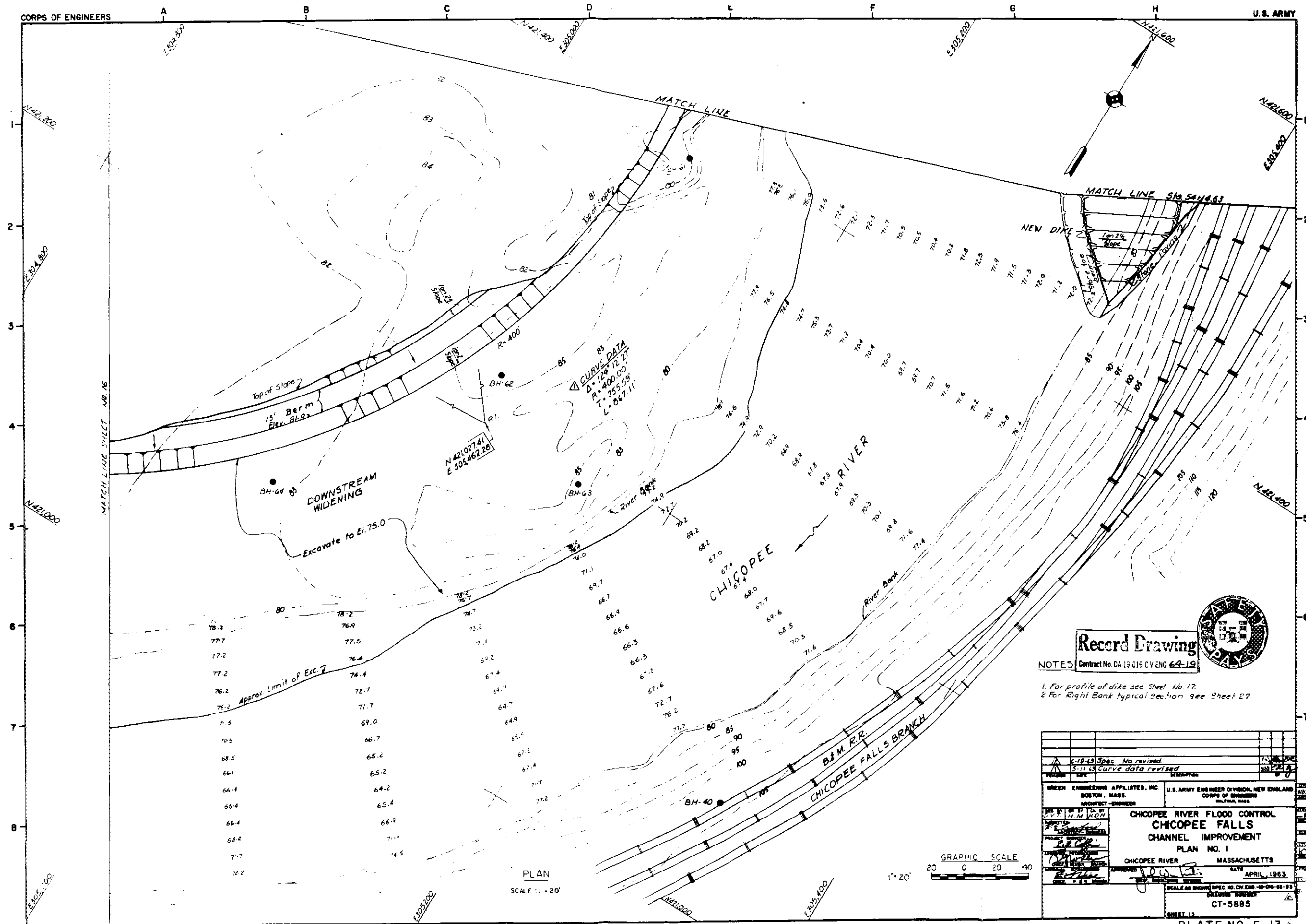


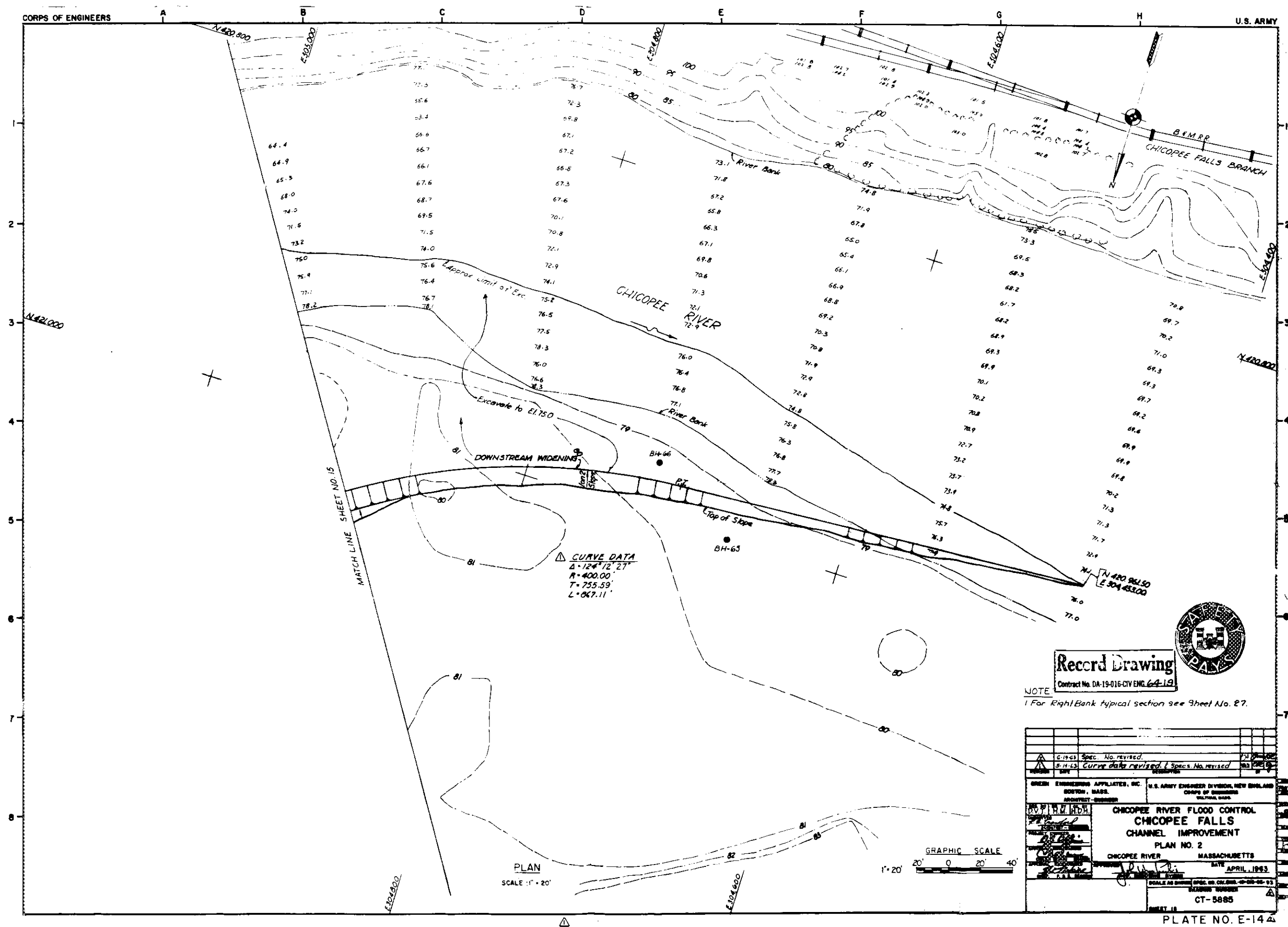


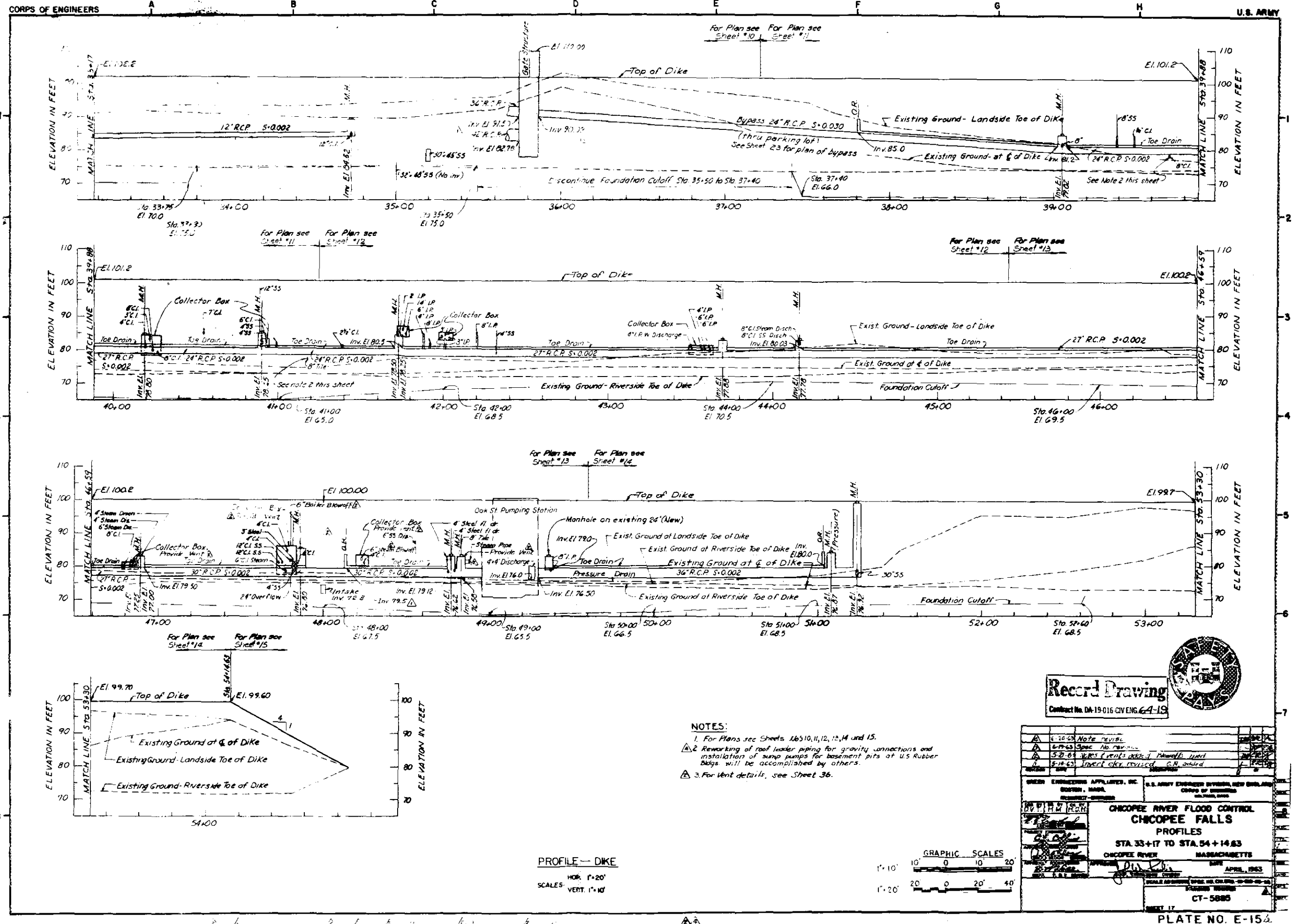


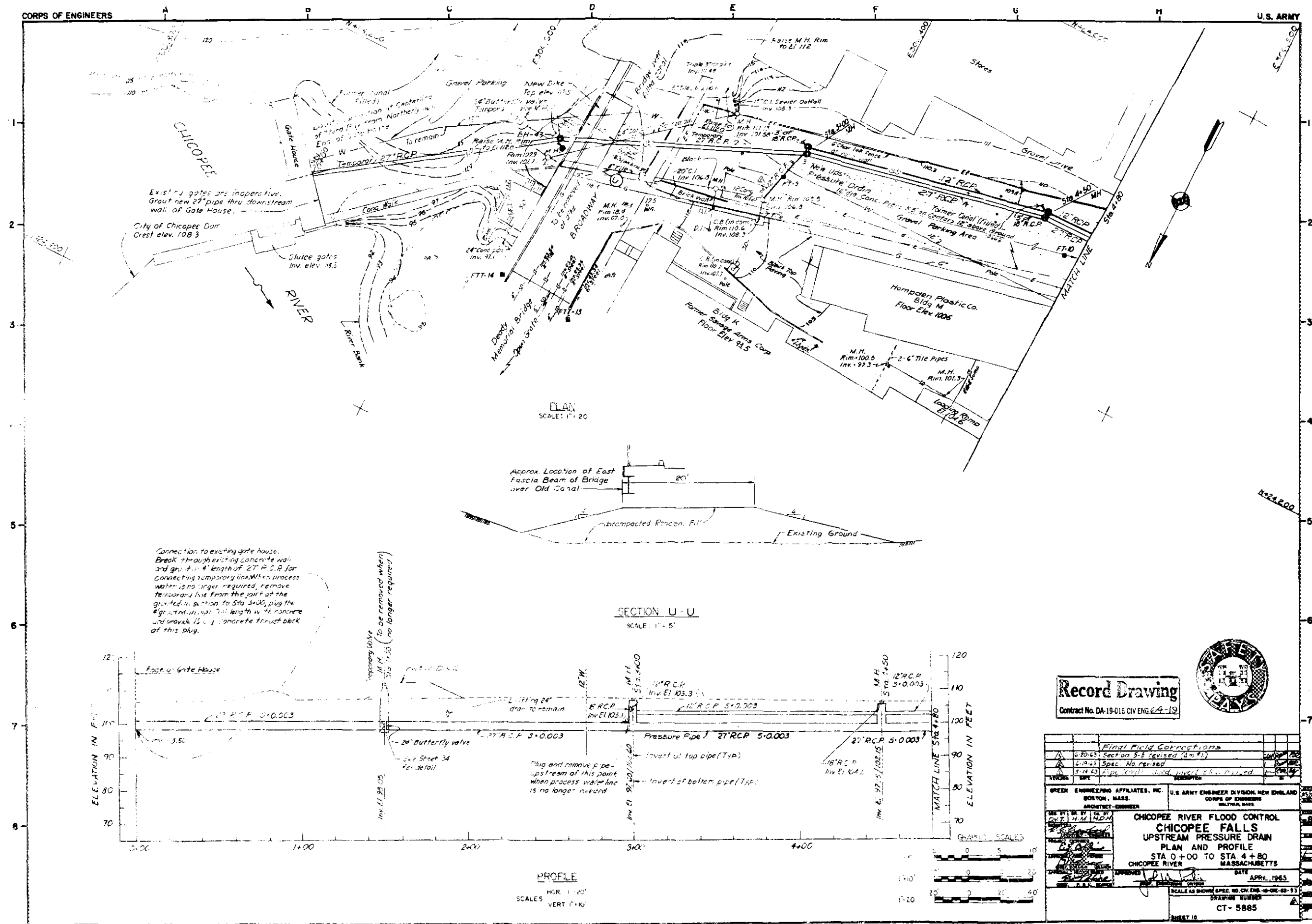


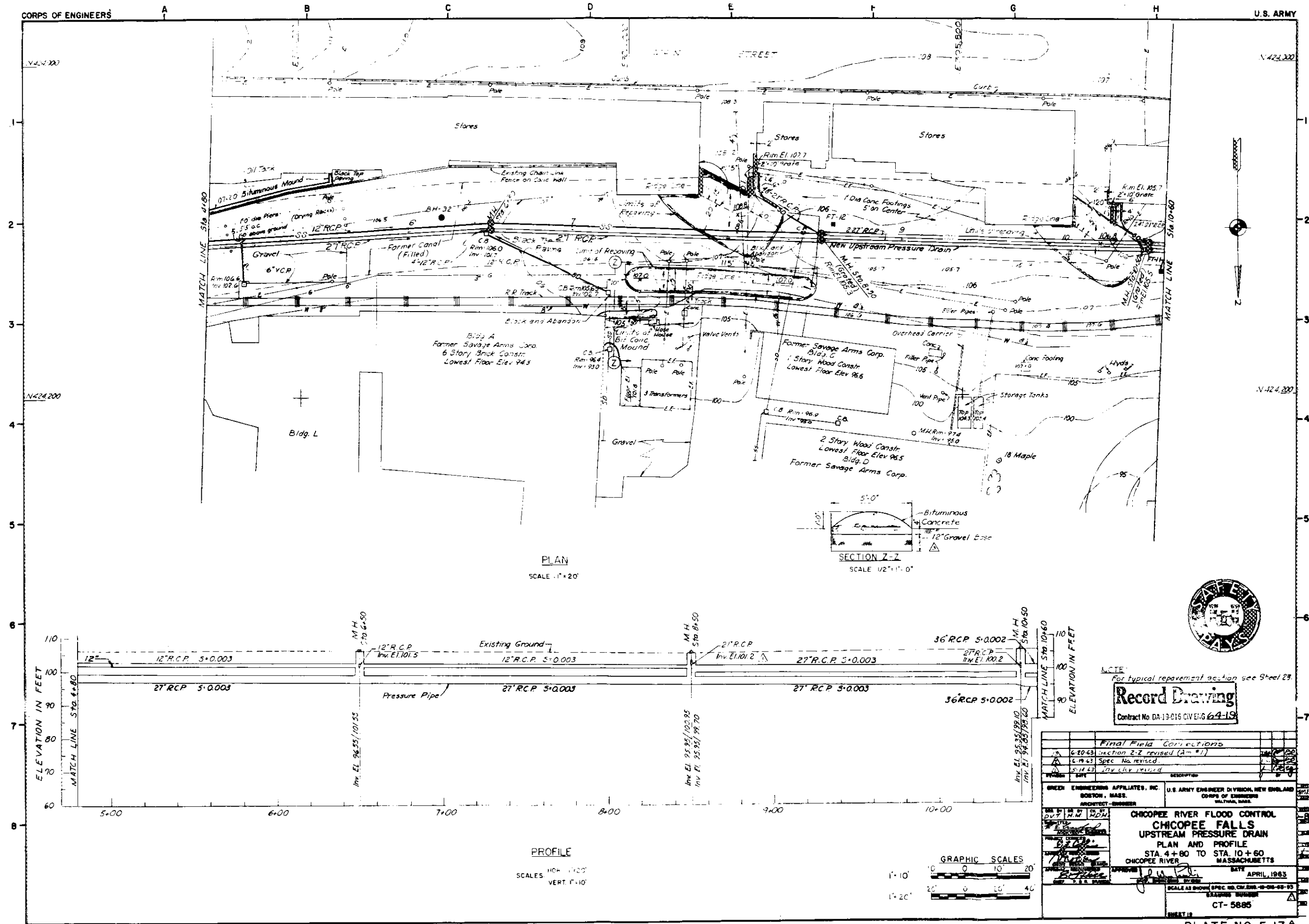


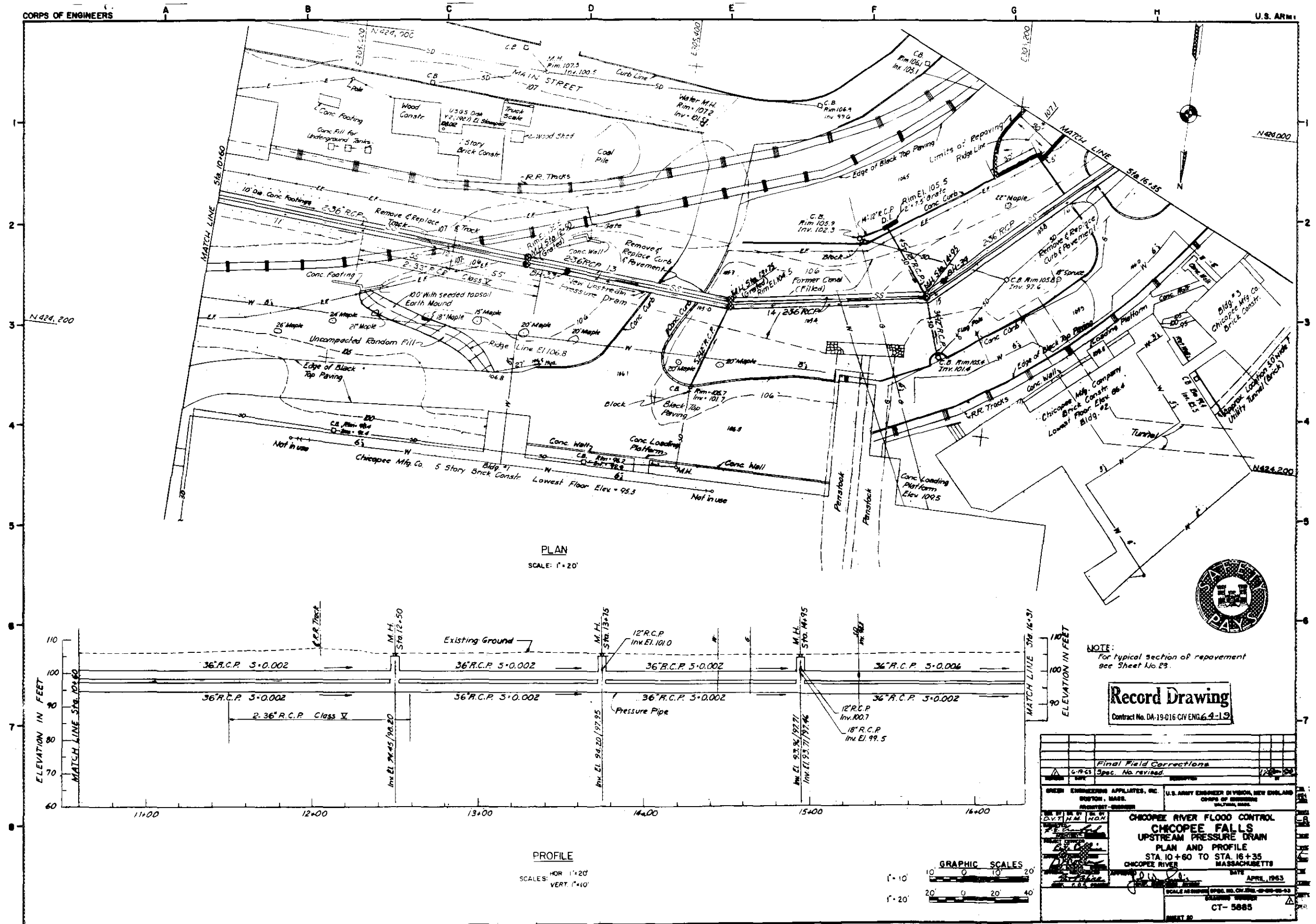




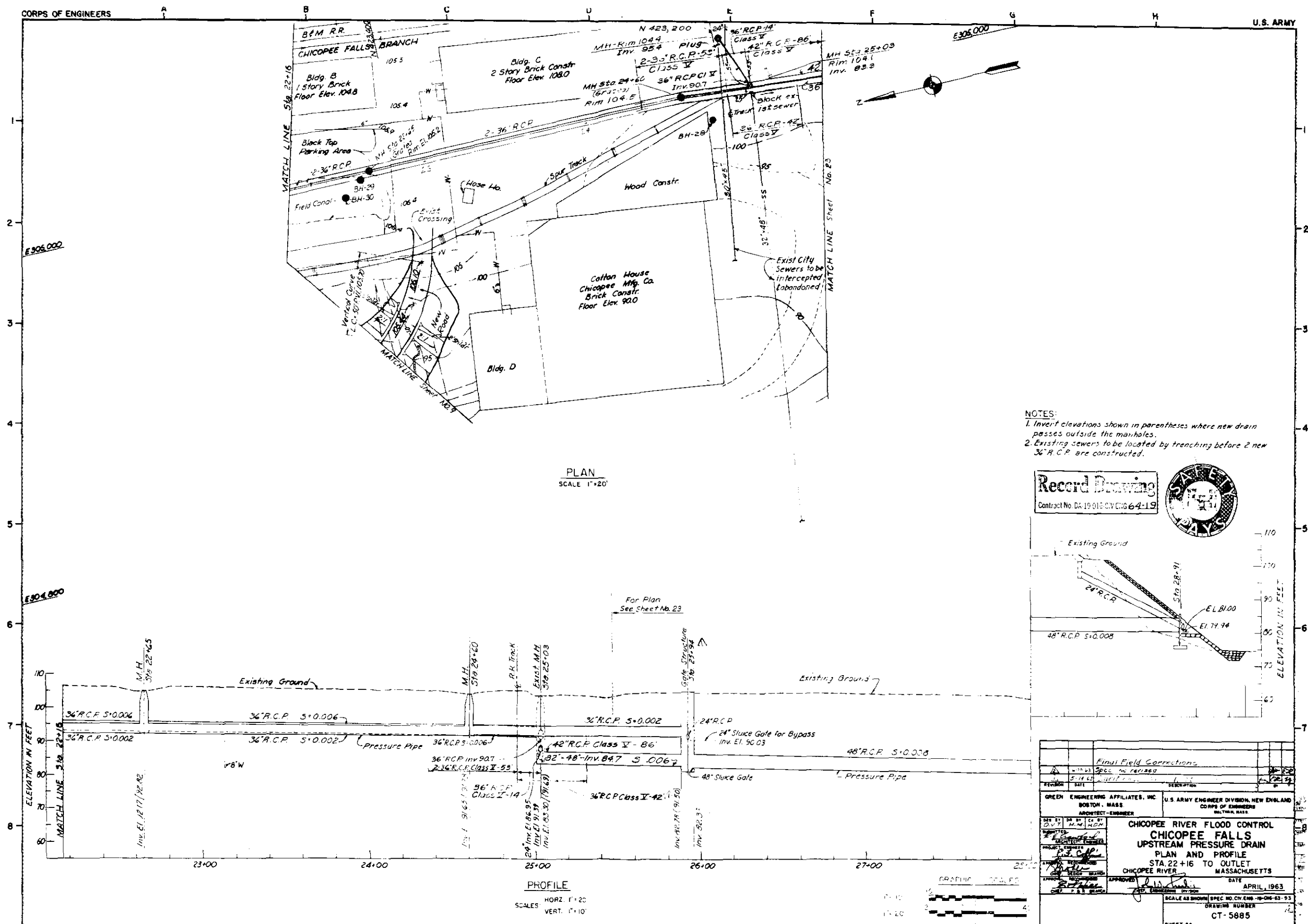




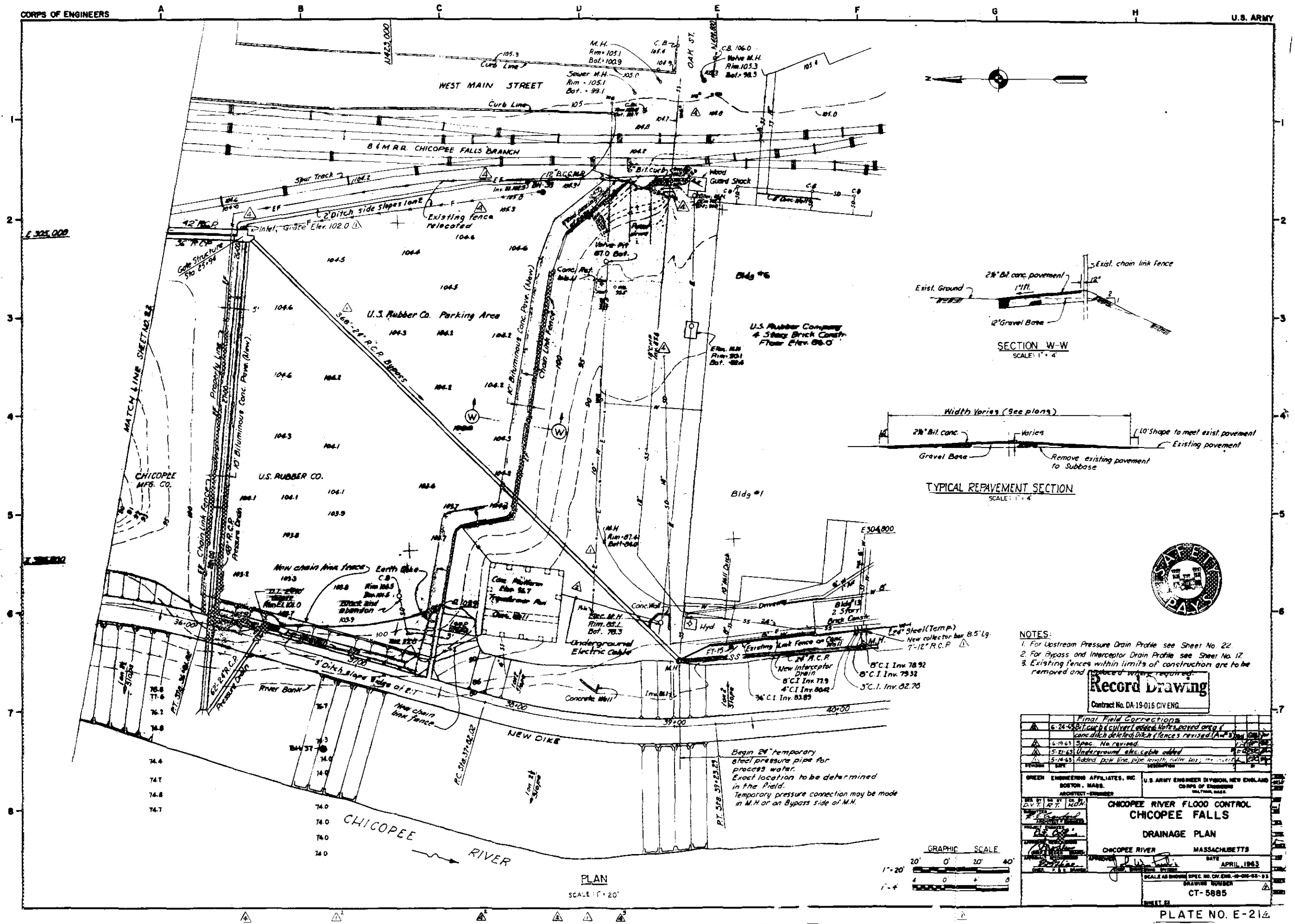


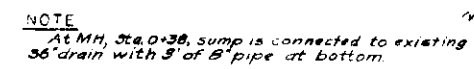




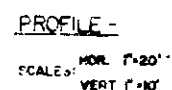








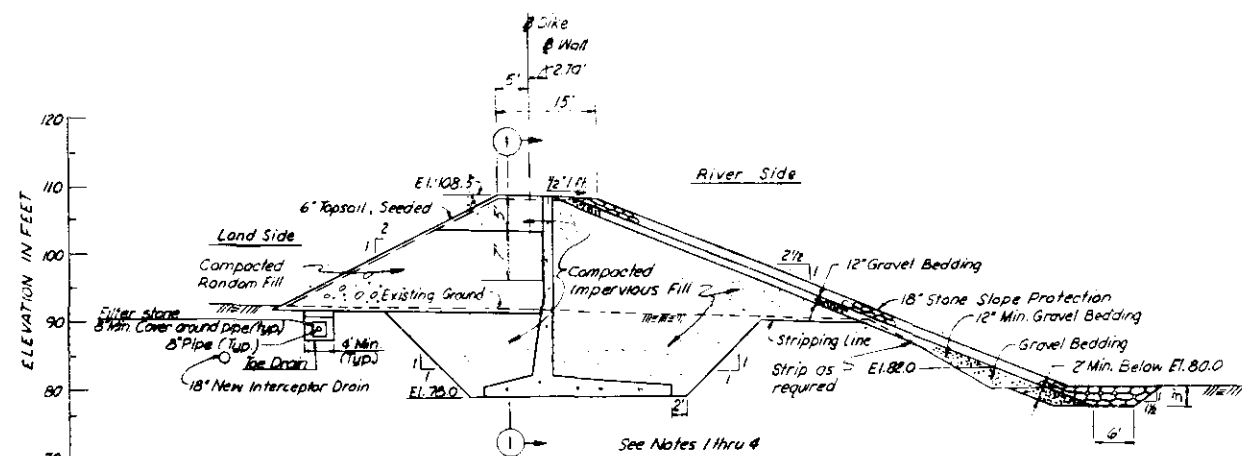
SCALE: 1" = 20'



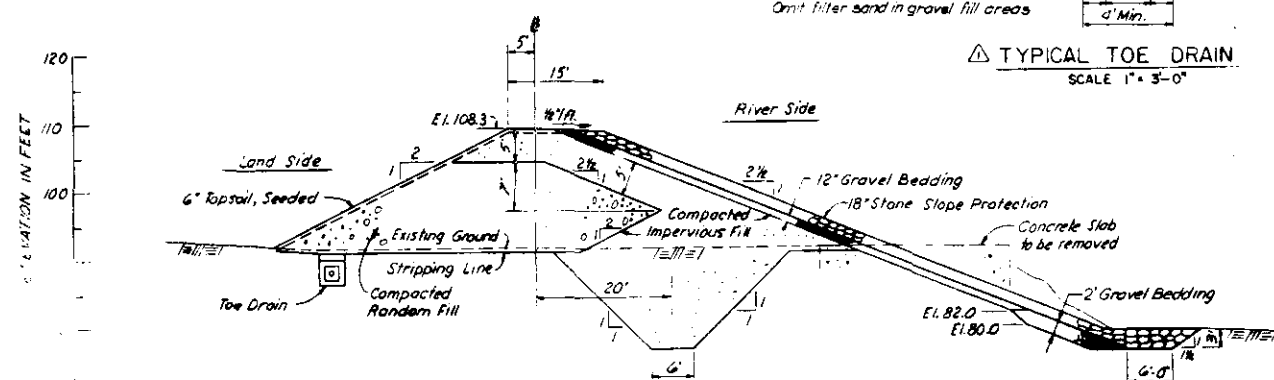
Contract No. DA-19-016-CIV ENG 64-19



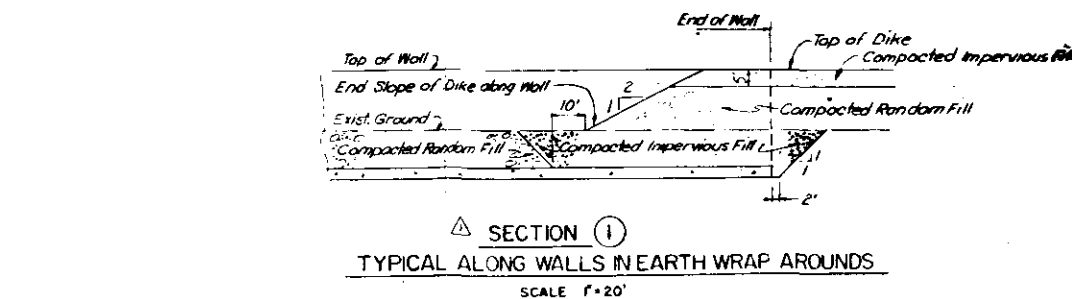
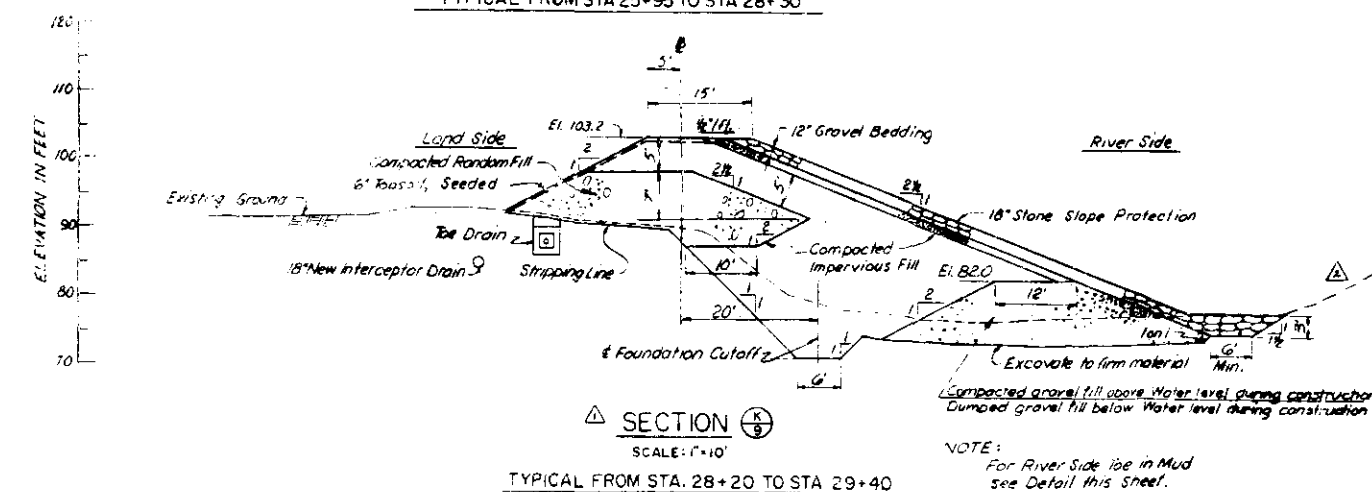
PLATE NO. E-22A



SECTION 2  
TYPICAL ADJACENT TO WALL  
SCALE: 1" = 10'



SECTION 4  
TYPICAL FROM STA. 10+20 TO STA. 16+30  
TYPICAL FROM STA. 25+95 TO STA. 28+30  
SCALE: 1" = 10'

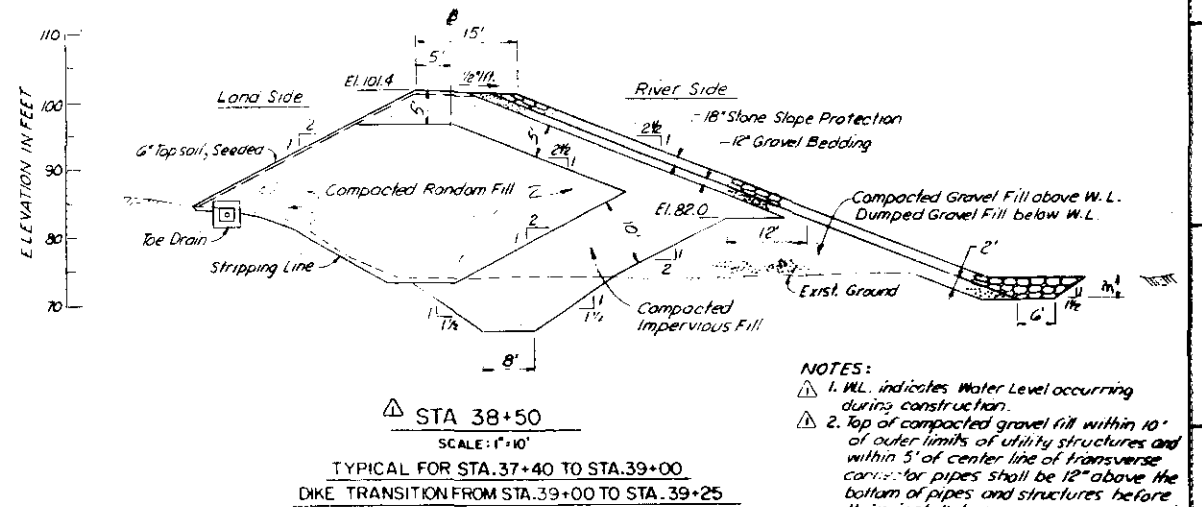
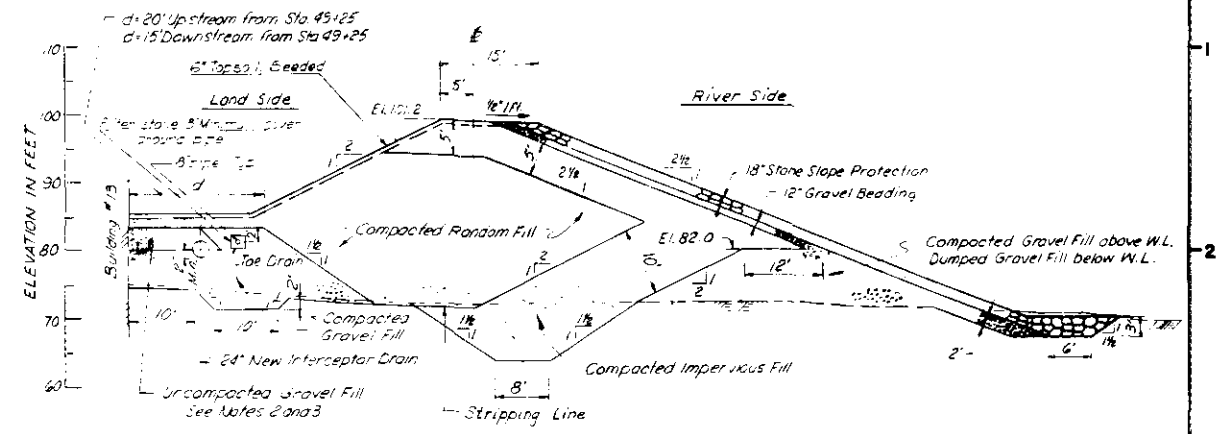
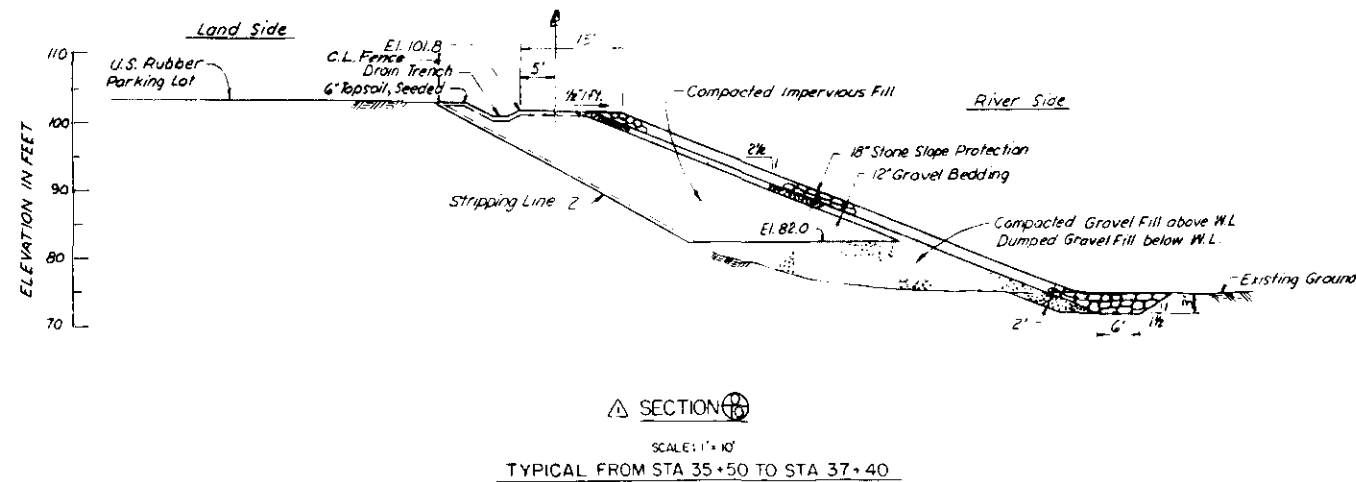
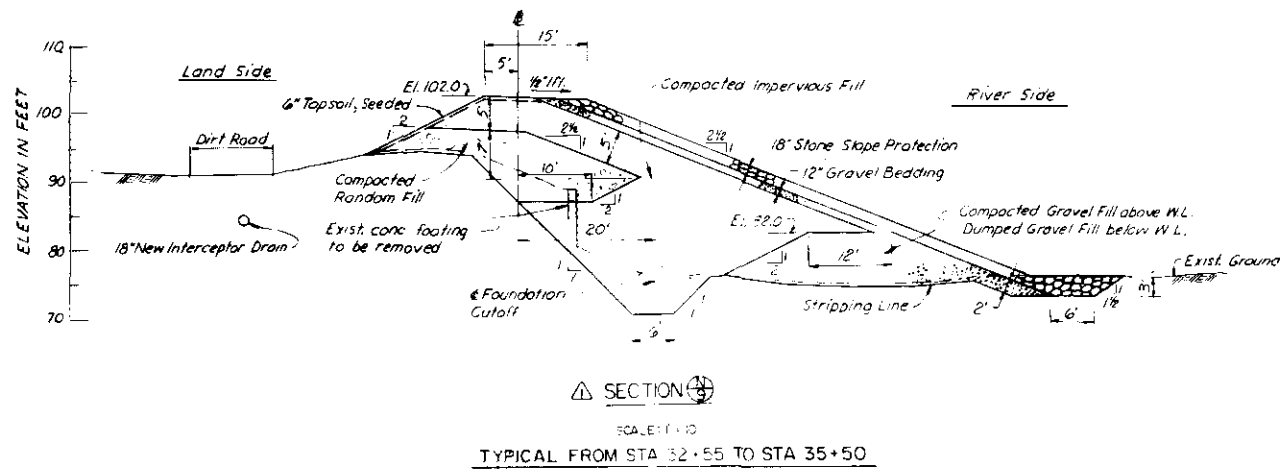
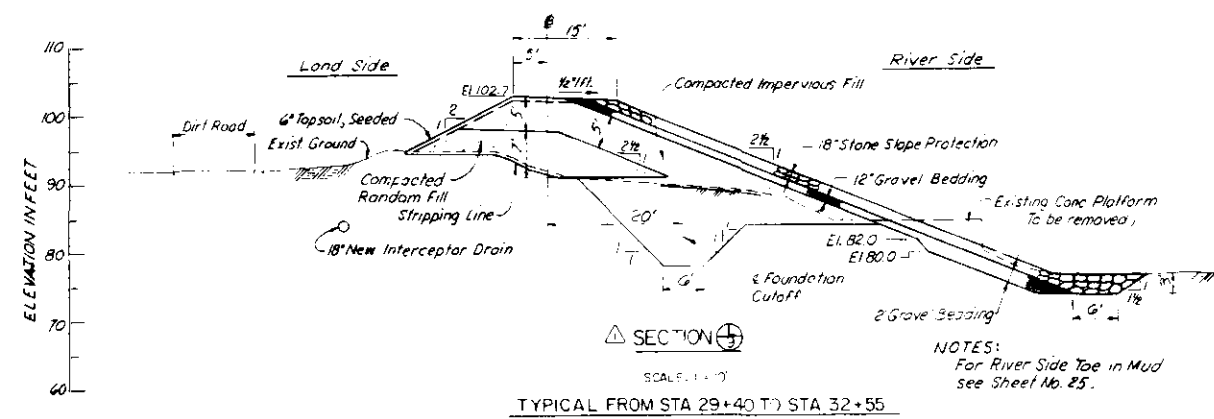


- NOTES:
1. Re: Section 5, 6, and Section 7 Sta. 25+40. Compacted impervious fill along wall below existing ground shall extend 10' beyond foundation area of dike. Transition from the Sections to normal dike Sections to be in distance of approximately 50 feet from end of wall.
  2. Special compaction required adjacent to walls see Section 4 of Specifications.
  3. Fill on both sides of walls shall be constructed concurrently with top elevation not varying by more than 2 feet.
  4. The surface of the initial layer of impervious fill material before compaction shall be 12 inches above the bottom of the wall stem.



Final Field Corrections		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND	
6-19-63	Spec. No. revised	DATE	11-19-63
5-21-63	Section title revised, sub-title added, note deleted	DATE	5-21-63
5-14-63	Section deleted, sections and notes added, section geometry and dimensions revised	DATE	5-14-63
REVISION	DATE	DESCRIPTION	
1	6-19-63	Spec. No. revised	
2	5-21-63	Section title revised, sub-title added, note deleted	
3	5-14-63	Section deleted, sections and notes added, section geometry and dimensions revised	

DESIGNED BY	DA-19-016 CIV ENG 64-19	U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CHECKED BY	DA-19-016 CIV ENG 64-19	CORPS OF ENGINEERS
APPROVED BY	DA-19-016 CIV ENG 64-19	MASSACHUSETTS
DATE	APRIL, 1963	
SCALE AS SHOWN SPEC. NO. CHENG-10-00-03-01		
DRAWING NUMBER	CT-5885	
SHEET NO.	22	

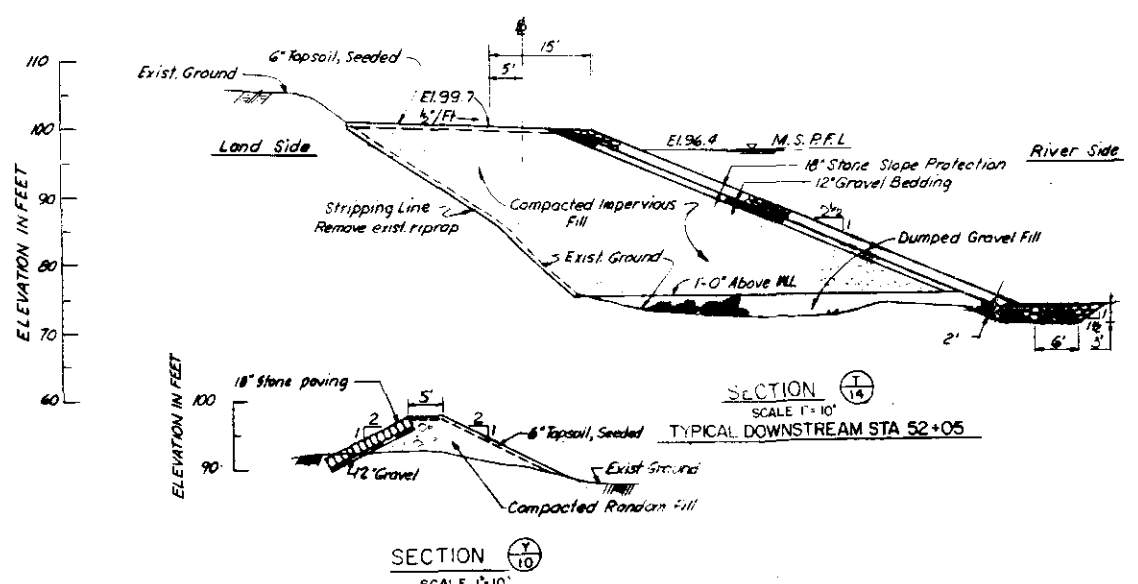
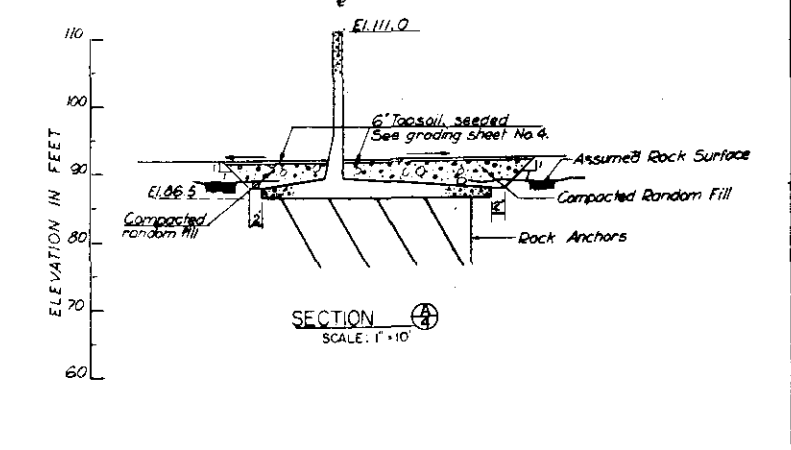
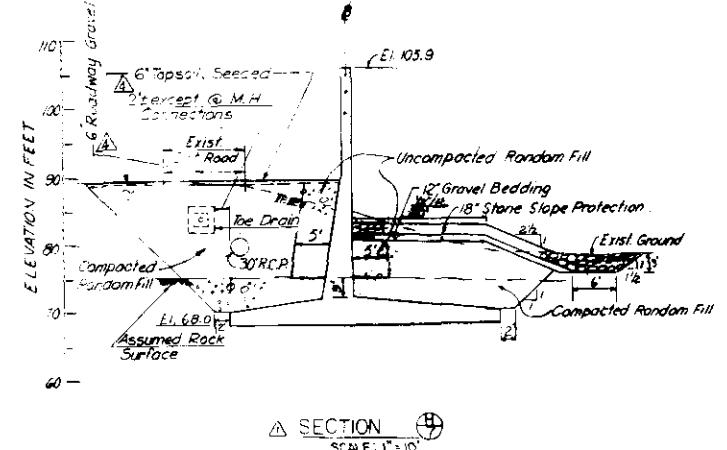
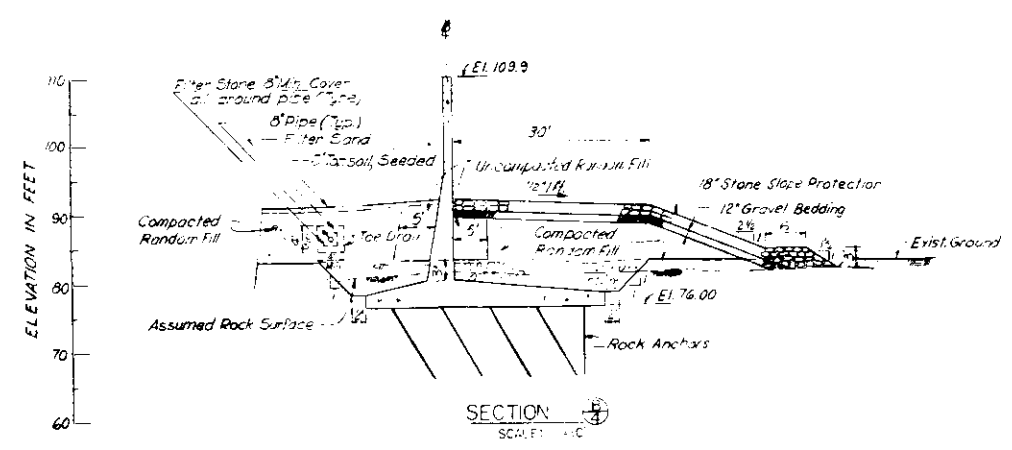


**Record Drawing**  
Contract No. DA-19-016-CV ENG 64-19

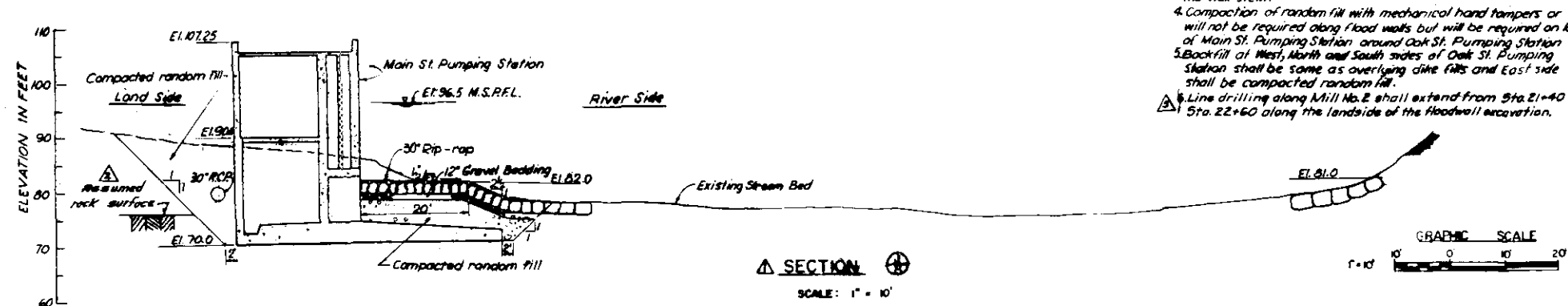
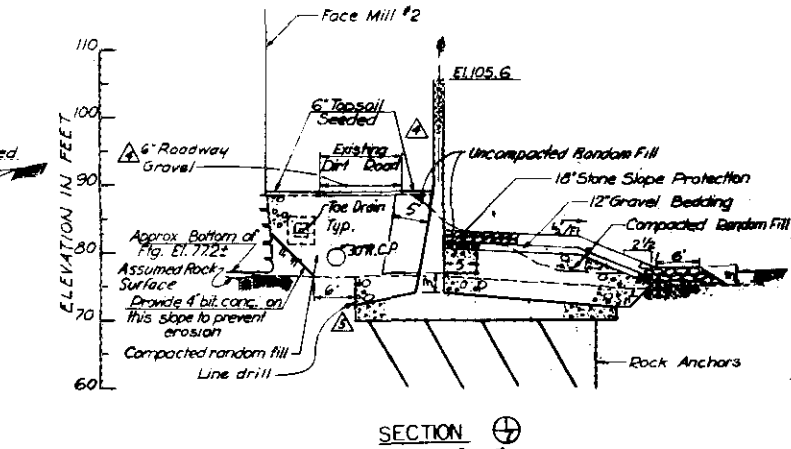


GRAPHIC SCALE  
10 0 10 20

6-75-63 Spec. No. revised 5-4-63 Sections deleted and added, notes added, section geometry and dimensions revised.	
GREEN ENGINEERING APPLICATES, INC. BOSTON, MASS. ARCHITECT-ENGINEER	U.S. ARMY ENGINEER DISTRICT, NEW ENGLAND CORPS OF ENGINEERS BOSTON, MASS.
<b>CHICOPEE RIVER FLOOD CONTROL CHICOPEE FALLS TYPICAL SECTIONS NO. 2 DIKE</b>	
CHICOPEE RIVER MASSACHUSETTS	DATE APRIL, 1963
CT-5885	



RIGHT BANK  
TYPICAL SECTION  
SCALE: 1" = 10'  
NOTE: See Plans for applicable portions of above Section



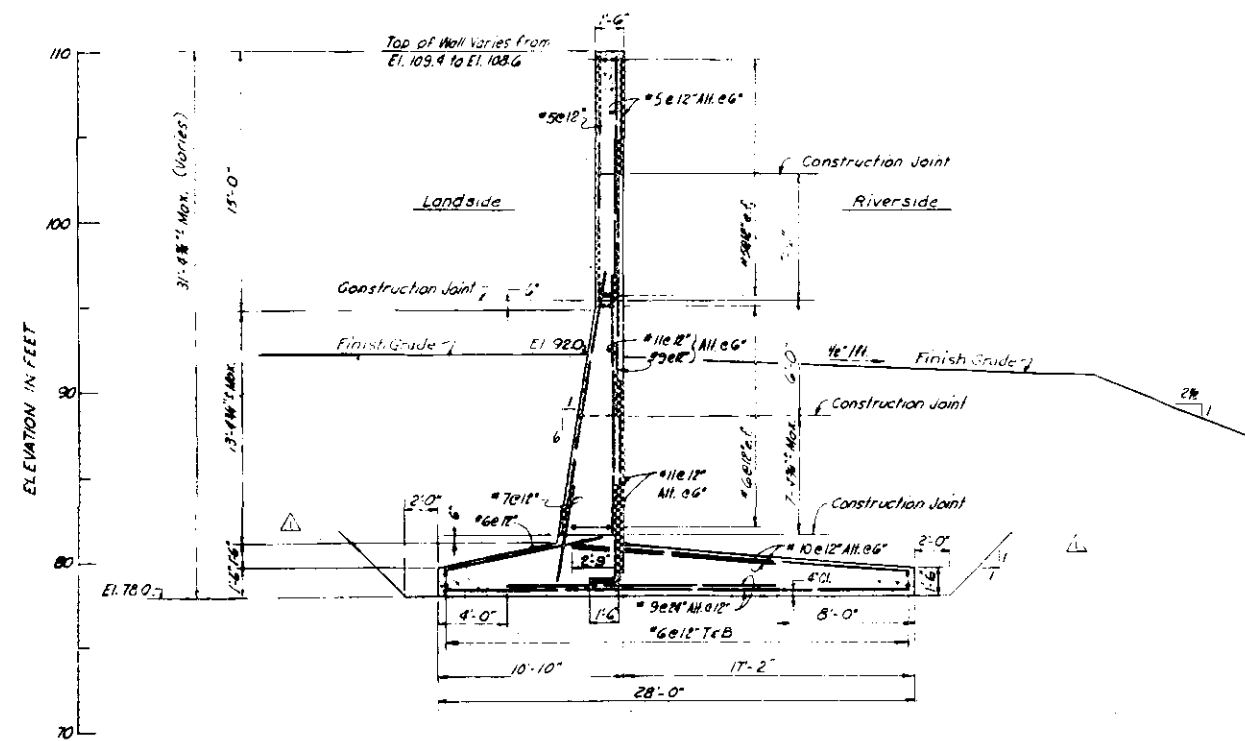
- NOTES:
1. M.L. Indicates Water Level during construction.
  2. No equipment shall operate within zones of uncompacted random fill along stems of flood walls except for spreading operations.
  3. The surface of the initial layer of fill material before compaction over base of flood walls shall be 12 inches above the bottom of the wall stem.
  4. Compaction of random fill with mechanical hand tampers or vibrators will not be required along flood walls but will be required on land side of Main St. Pumping Station around Oak St. Pumping Station.
  5. Backfill at West, North and South sides of Oak St. Pumping Station shall be same as overlying dike fills and East side shall be compacted random fill.
  6. Line drilling along Mill No. 2 shall extend from Sta. 21+40 to Sta. 22+60 along the landside of the floodwall excavation.

**Record Drawing**  
Contract No. DA-19-016-CV-ENG-64-19

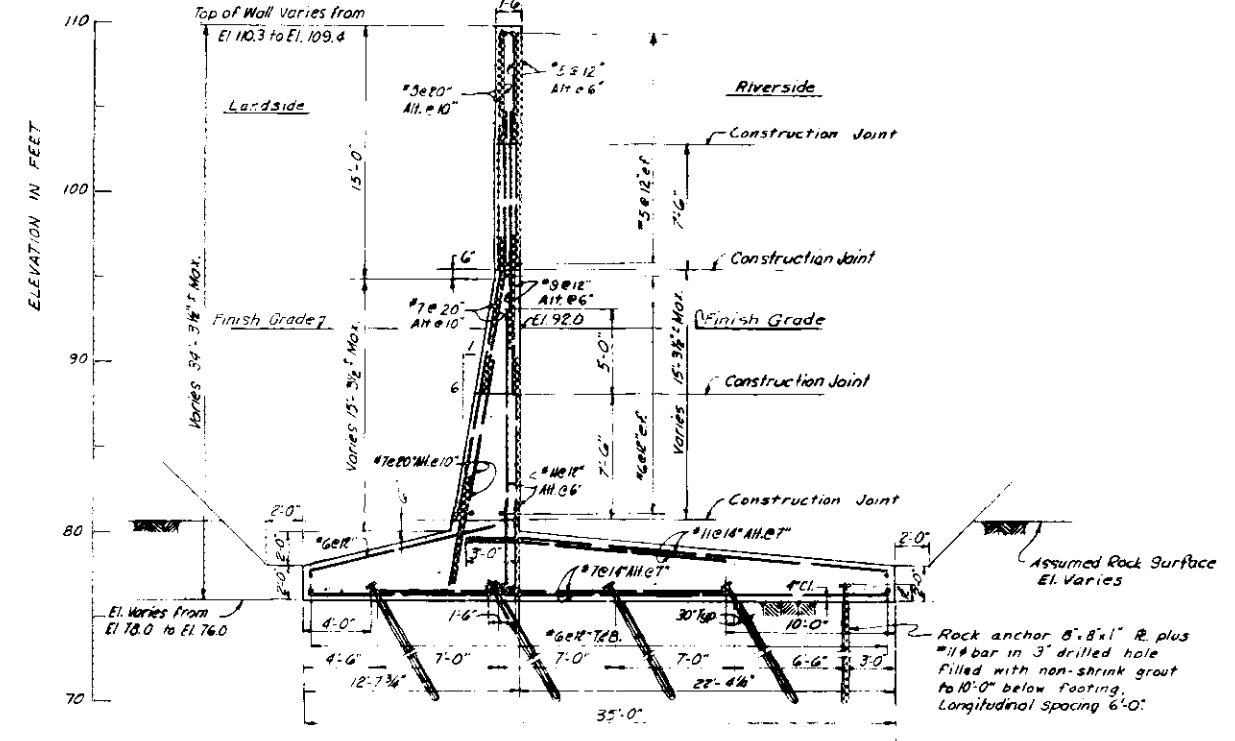
**SAFETY PAYS**

1-18-63	Note added E.	used (Am. 2)	12
1-19-63	Sections rev.	2)	12
6-19-63	Spec. No. revised		12
8-11-63	Back line & note added		12
5-16-63	Sections revised		12

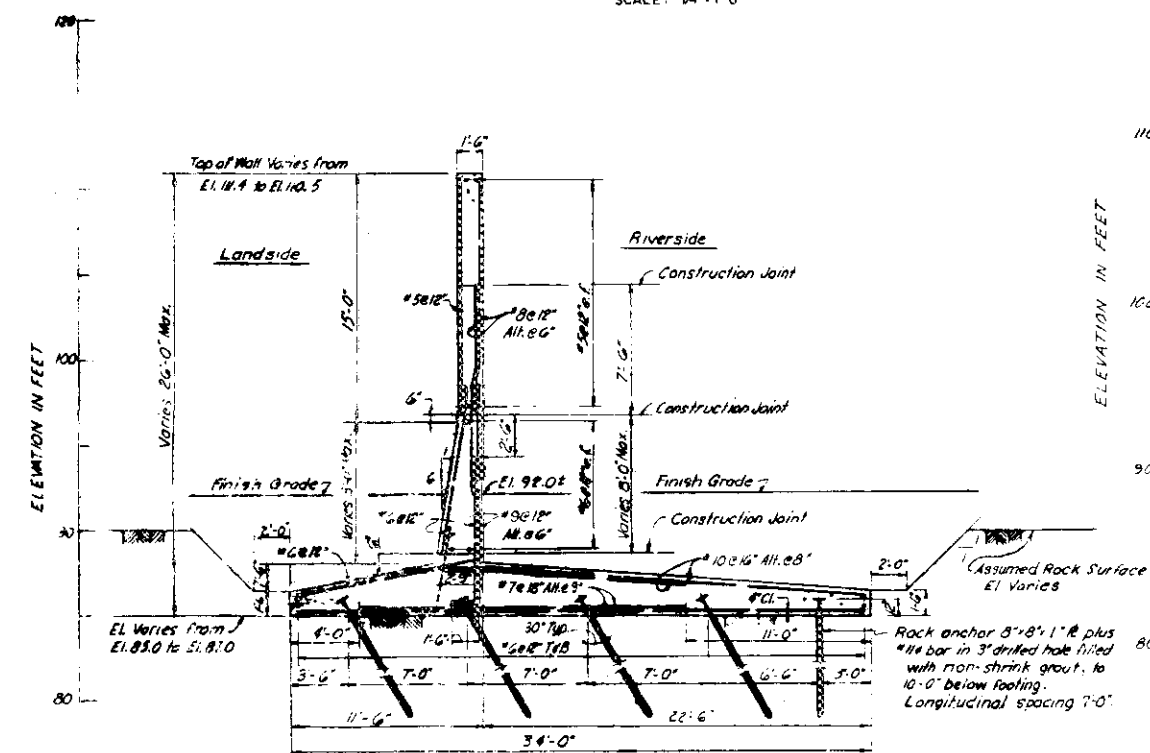
ENGINEER APPLIED, INC.  
BOSTON, MASS.  
U.S. ARMY ENGINEER OFFICE, NEW BRIDGES  
CHICOPPEE RIVER FLOOD CONTROL  
CHICOPPEE FALLS  
MISCELLANEOUS DETAILS  
CHICOPPEE RIVER  
MASSACHUSETTS  
APR 1964  
CT-5885



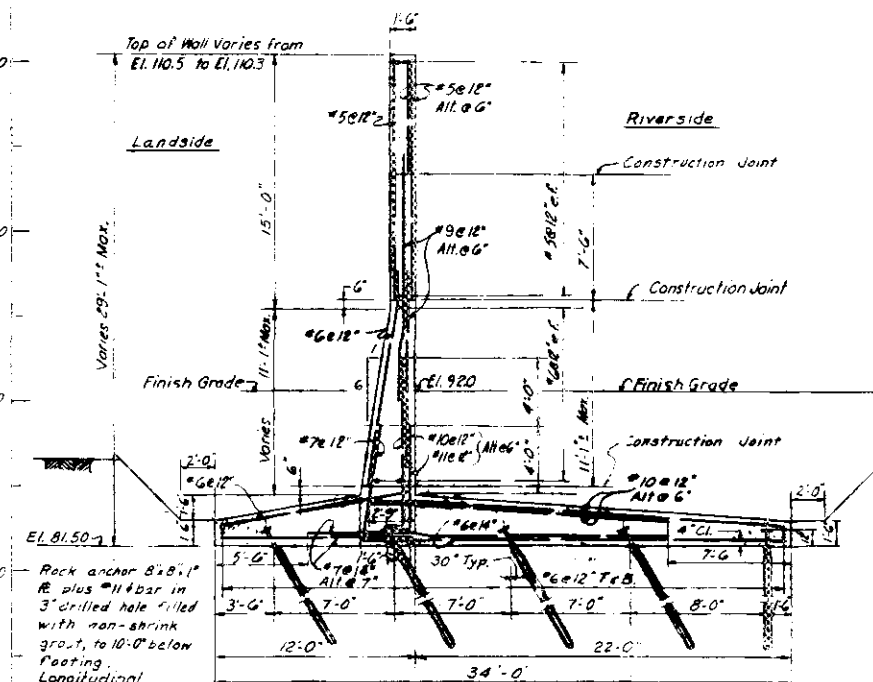
WALL TYPE D

STA. 8+20 TO STA. 9+40  
SCALE: 1/4" = 1'-0"

WALL TYPE C

STA. 6+20 TO STA. 8+20  
SCALE: 1/4" = 1'-0"

WALL TYPE A

STA. 4+35 TO STA. 6+00  
SCALE: 1/4" = 1'-0"

WALL TYPE B

STA. 6+00 TO STA. 6+20  
SCALE: 1/4" = 1'-0"

## NOTES

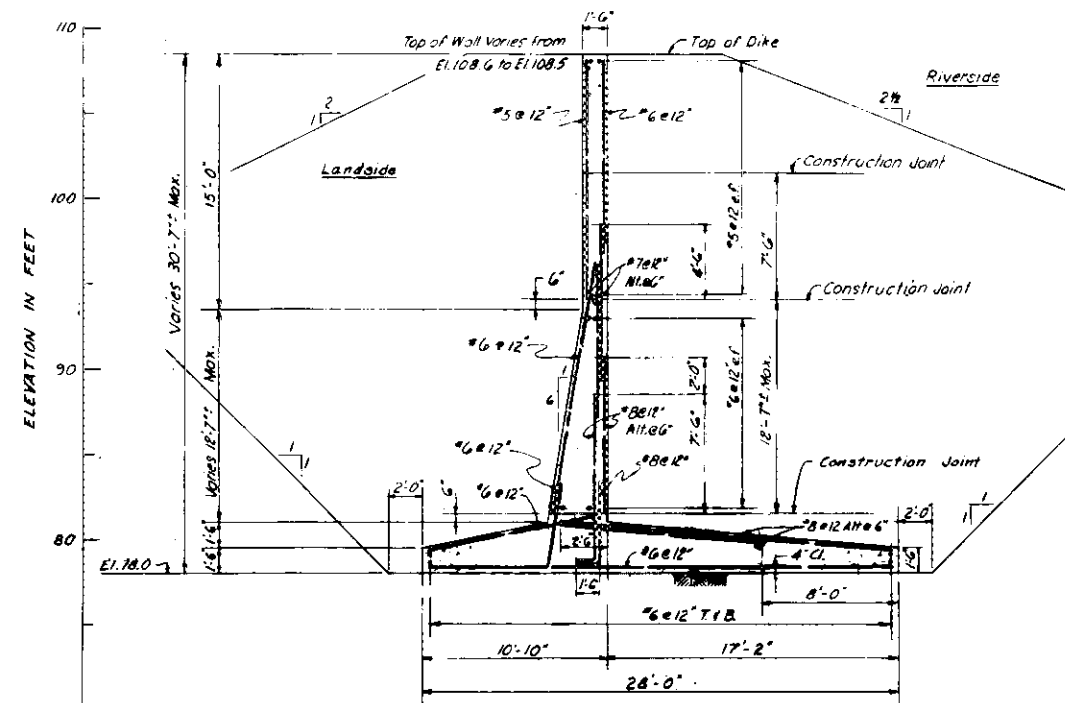
1. Provide 3" clear cover over main reinforcing except as shown.
2. Where walls are to be constructed on rock, weathered and deteriorated rock shall be removed from the foundation area.
3. All splices shall be diameters of smaller bar.
4. The walls are designed for the footing elevations shown on the drawings. Any change of these elevations may require redesign and must have the approval of the Contracting Officer.
5. For toe drain locations, see plan profile sheets.
6. For rock anchor plate detail, see sheet 31.
7. Wall monoliths along curves may be constructed as straight chords.

Record Drawing

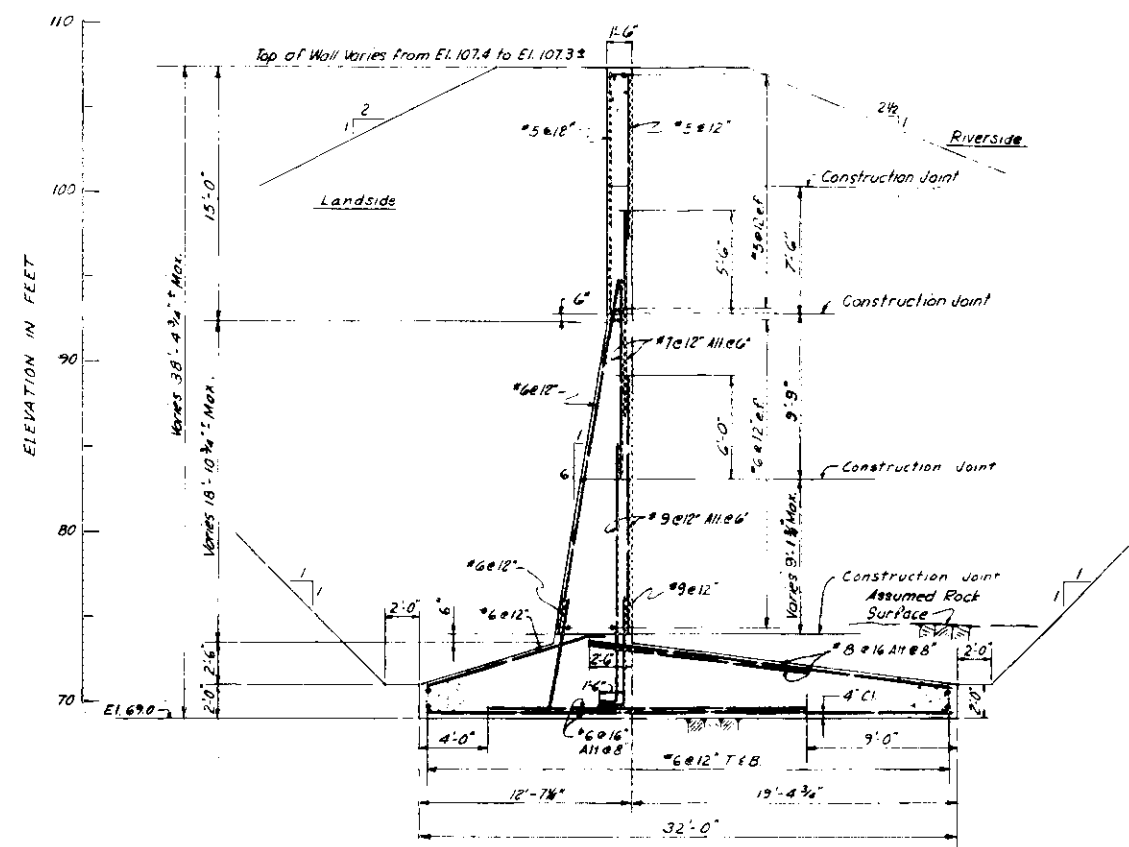
Contract No. DA-19-016 CIV ENG. 64-19

GREEN ENGINEERING APPLICATES, INC. BOSTON, MASS. ARCHITECT-ENGINEER		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS SALTUN, MASS.	
CHICOPEE RIVER FLOOD CONTROL CHICOPEE FALLS TYPICAL SECTIONS NO. 1 FLOOD WALLS MASSACHUSETTS		DATE APRIL, 1963 DRAWING NUMBER CT-5885	
SCALE AS SHOWN SPEC. NO. CIV. ENG. 10-08-03-13		SHEET 10	

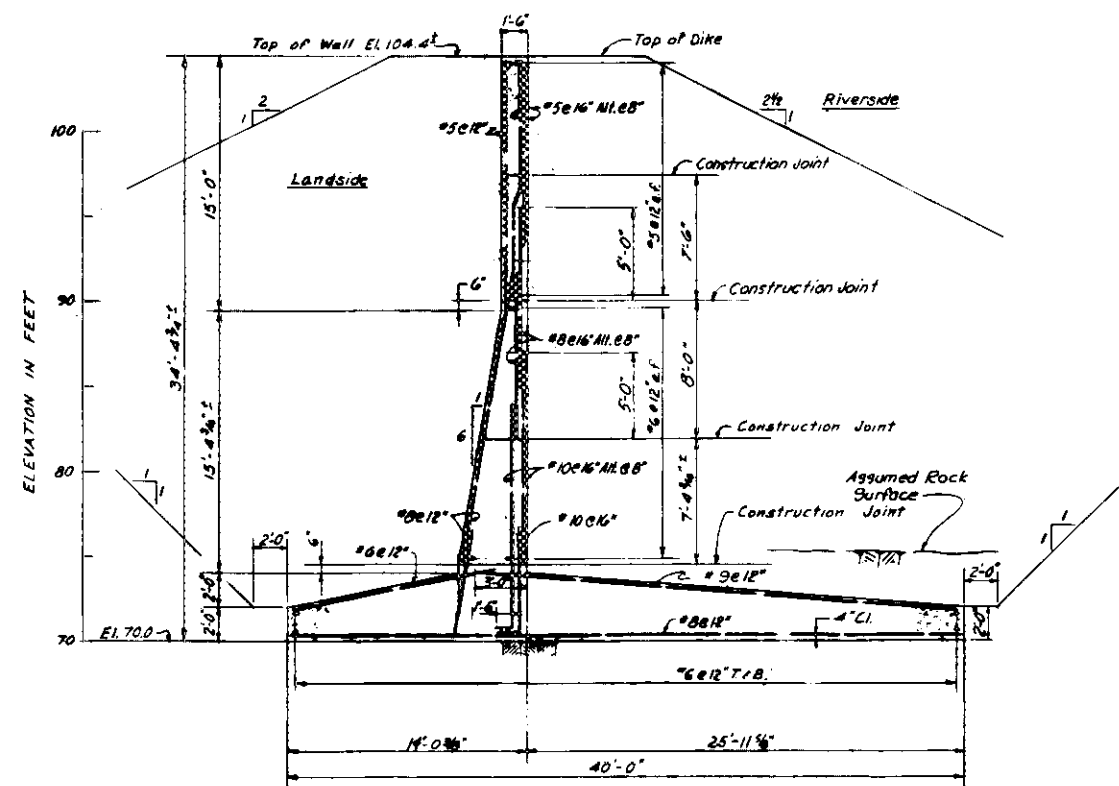




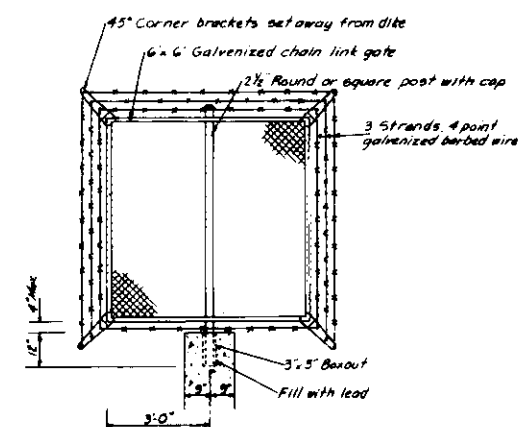
WALL TYPE H  
STA 9+40 TO STA 9+69.8  
SCALE: 1/4" = 1'-0"



WALL TYPE J  
STA 16+81.8 TO STA 17+20  
SCALE: 1/4" = 1'-0"



WALL TYPE K  
STA 25+00 TO STA 25+20  
SCALE: 1/4" = 1'-0"



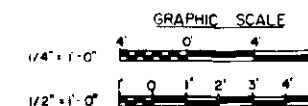
△ FENCE FAN ON FLOODWALLS  
SCALE 1/2" = 1'-0"

NOTE: Fans are to be installed on top of floodwalls at Sta. 9+16, Sta. 17+24, and Sta. 24+39.

NOTE  
1. For Flood Wall Notes see sheet 28

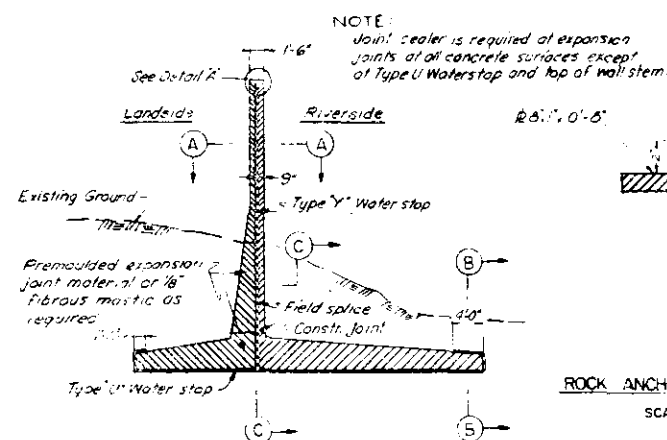
Record Drawing

Contract No. DA-19-016 CIV ENG 64-19



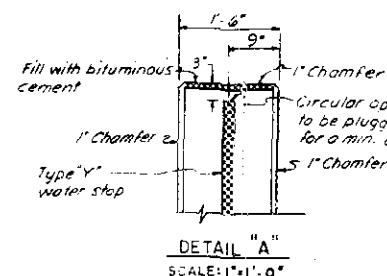
Final Field Corrections		DATE	
F-19-43 Fence Fan added (AM 7)		APRIL, 1963	
0-19-43 Spec. No. revised		DATE	
DESIGNED BY		CHECKED BY	
GREEN ENGINEERING APPLIQUES, INC.		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND	
BOSTON, MASS.		CORPS OF ENGINEERS	
PROJECT - DESIGN		SALTEN, MASS.	
CHICOPEE RIVER FLOOD CONTROL		CHICOPEE RIVER	
CHICOPEE FALLS		MASSACHUSETTS	
TYPICAL SECTIONS NO. 3		DATE	
FLOOD WALLS		APRIL, 1963	
CHICOPEE RIVER		MASSACHUSETTS	
SCALE AS SHOWN (SPEC. NO. CIV. ENG. 64-19)		DRAWING NUMBER	
CT-5885		SHEET 28	



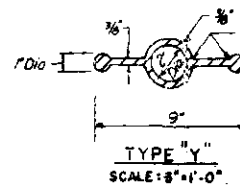


TYPICAL SECTION  
SCALE: 1/8" = 1'-0"

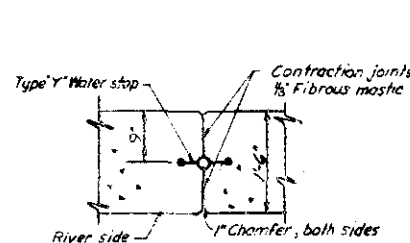
ROCK ANCHOR PLATE DETAIL  
SCALE: 3" = 1'-0"



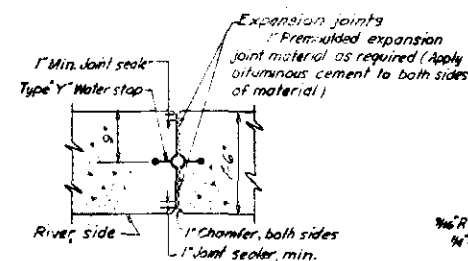
DETAIL "A"  
SCALE: 1" = 1'-0"



TYPE "Y"  
SCALE: 3" = 1'-0"

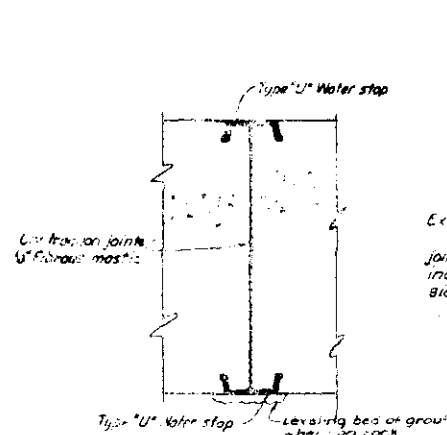


MONOLITH JOINT TYPE "A"

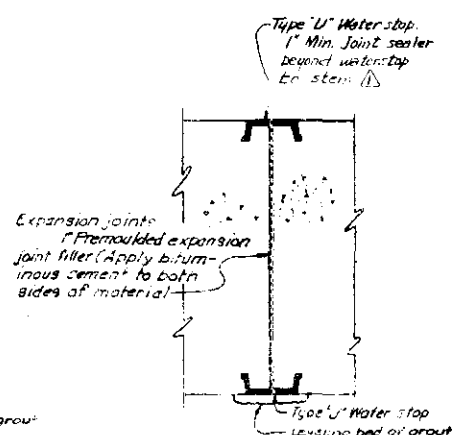


MONOLITH JOINT TYPE "B"

SECTION A-A  
SCALE: 1" = 1'-0"



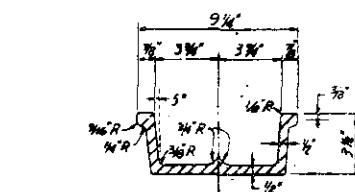
MONOLITH JOINT TYPE "A"



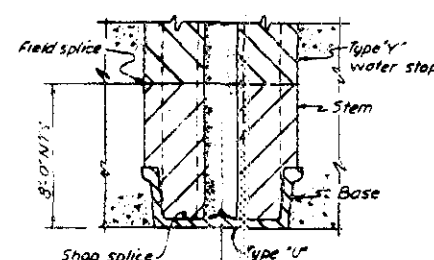
MONOLITH JOINT TYPE "B"

SECTION B-B  
SCALE: 1" = 1'-0"

MONOLITH JOINT DETAILS

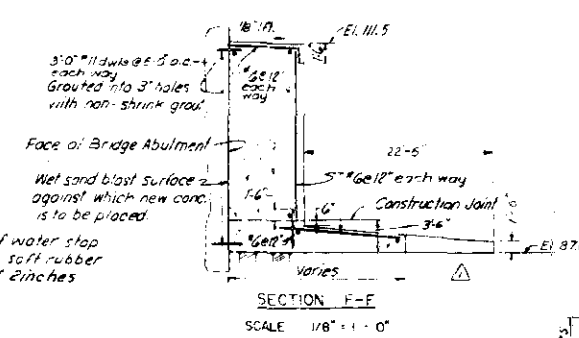


TYPE "U"  
SCALE: 3" = 1'-0"

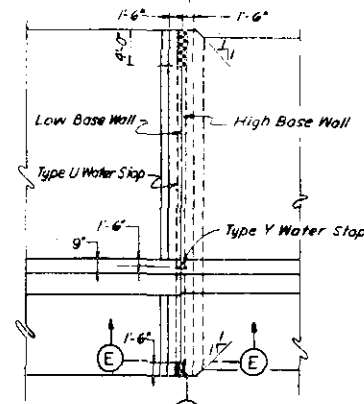


SECTION C-C  
SCALE: 3" = 1'-0"

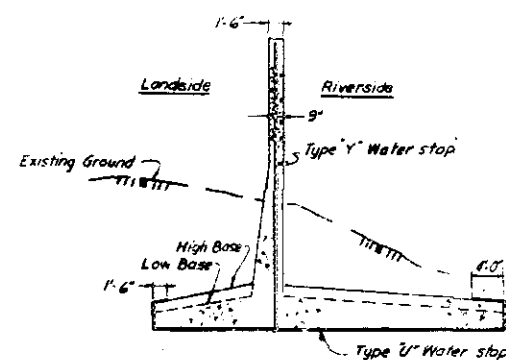
WATER STOP DETAILS



SECTION F-F  
SCALE: 1/8" = 1'-0"



PLAN  
SCALE: 1/8" = 1'-0"



SECTION D-D  
SCALE: 1/8" = 1'-0"

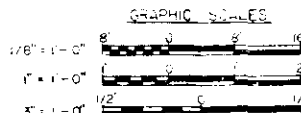
TRANSITIONS AT CHANGES IN WALL HEIGHT



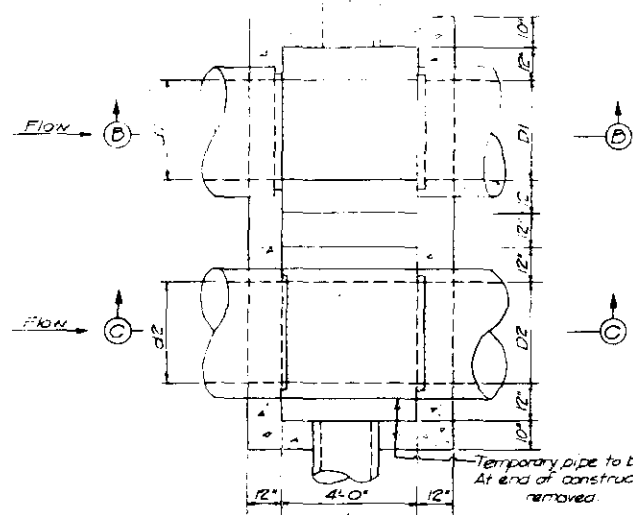
PLAN OF TERMINAL MONOLITH  
AT DEADY MEMORIAL BRIDGE  
SCALE: 1/8" = 1'-0"

NOTE:  
1. For Flood wall notes see sheet 28

Record Drawing  
Contract No. DA-19-016 CIV ENG 69-19

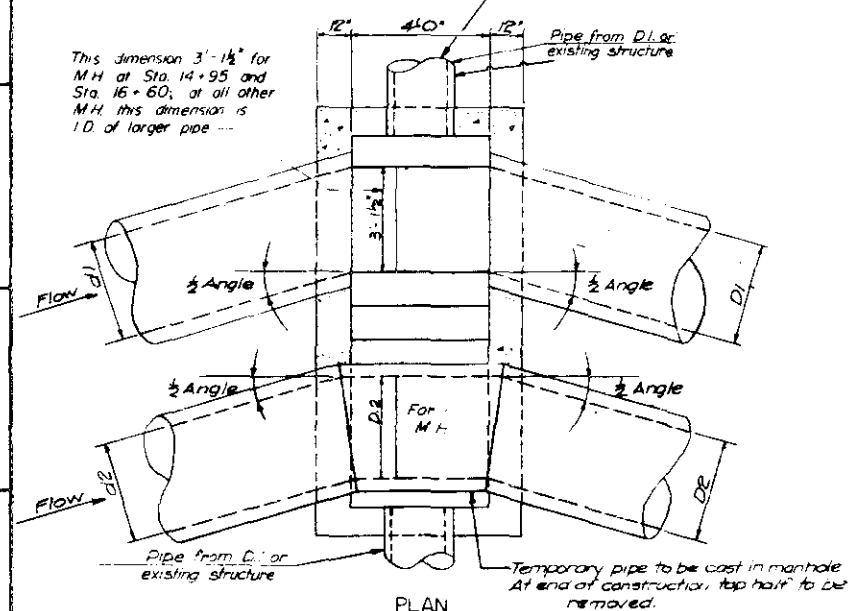


GREEN ENGINEERING APPLICATES, INC. BOSTON, MASS. ARCHITECT-ENGINEER		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	
DESIGNED BY: [Signature] CHECKED BY: [Signature] DATE: [Date]		CHICOPEE RIVER FLOOD CONTROL CHICOPEE FALLS TYPICAL DETAILS FLOOD WALLS CHICOPEE RIVER, MASSACHUSETTS DATE: APRIL, 1963 DRAWING NUMBER: CT-5885	

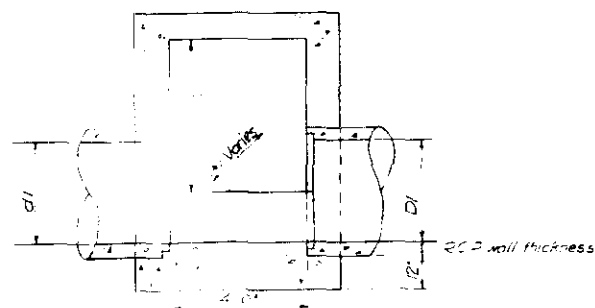


PLAN  
SCALE: 1/2" = 1'-0"

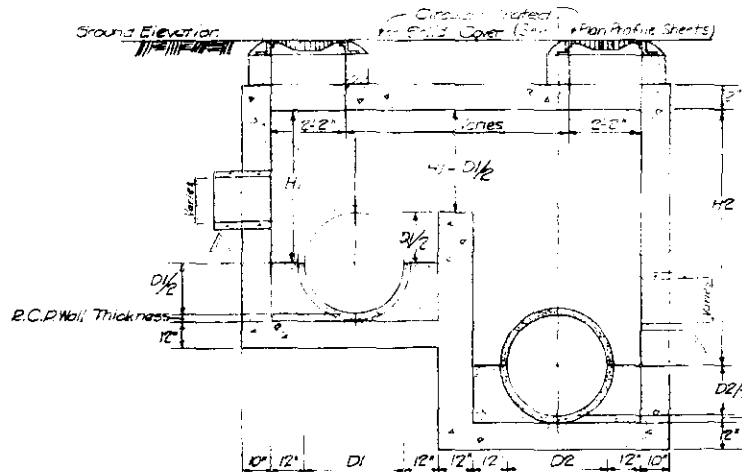
This dimension 3'-1 1/2" for  
M.H. at Sta. 14+95 and  
Sta. 16+60; at all other  
M.H. this dimension is  
1.0' of larger pipe ---



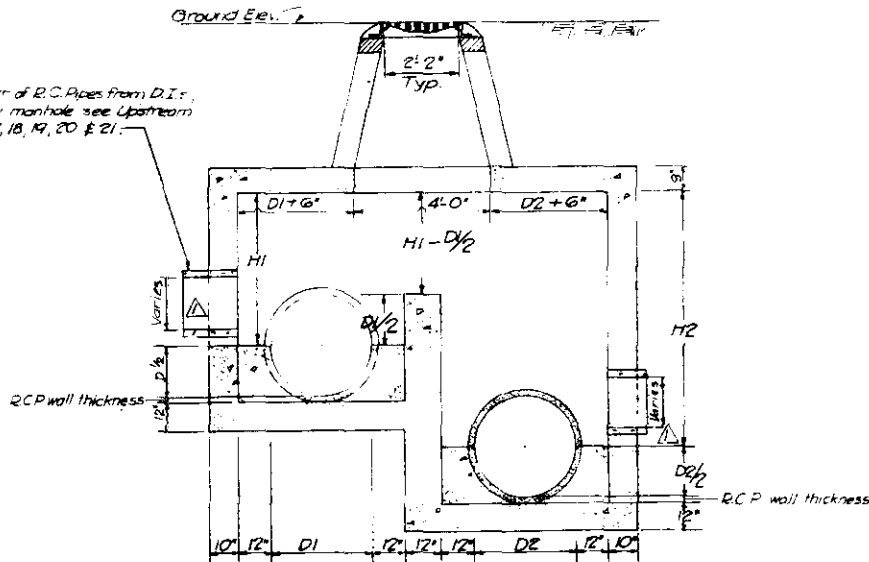
PLAN  
SCALE: 1/2" = 1'-0"



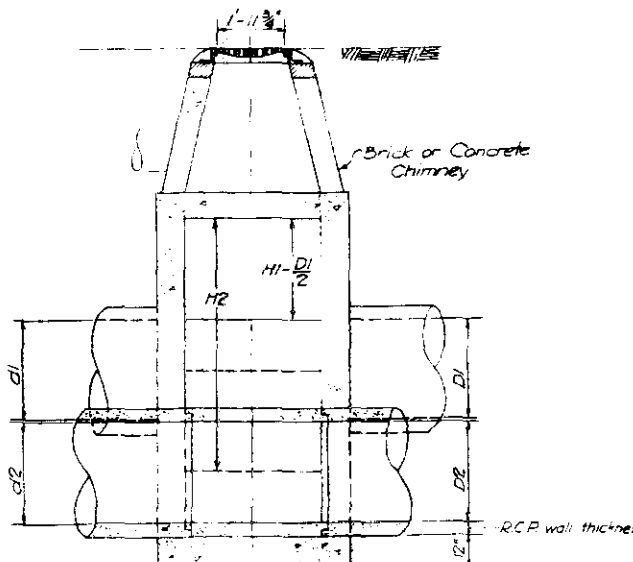
PLAN  
SCALE: 1/2" = 1'-0"



SECTION A1-A1  
SCALE: 1/2" = 1'-0"



SECTION A2-A2  
SCALE: 1/2" = 1'-0"



SECTION C-C OF A-2 TYPE  
SCALE: 1/2" = 1'-0"

TABLE OF VARIABLES

M.H. Sta.	Approx. Depth	d1	D1	Inv. d1	Inv. D1	d2	D2	Inv. d2	Inv. D2	H1	H1-D1	H2	Ground Elev.	Type of	No. of
3+00	-6"	12"	12"	102.15	102.5	27"	27"	97.60	97.60	2.30	1.50	6'-8 1/2"	106.52	none	2
4+50	+5"	12"	12"	102.15	102.5	27"	27"	97.15	97.15	2.30	1.50	6'-8 1/2"	106.52	none	2
6+50	+2 1/2"	12"	12"	101.55	101.55	27"	27"	96.55	96.55	2.00	1.50	6'-8 1/2"	106.52	none	2
8+50	0"	12"	12"	100.95	100.95	27"	27"	95.95	95.95	2.63	1.50	6'-8 1/2"	106.52	none	2
10+50	+1"	27"	33"	99.10	98.60	27"	33"	95.35	94.85	4.02	2.65	7'-9 1/2"	105.52	none	2
12+50	0"	33"	33"	98.20	98.20	33"	33"	94.45	94.45	3.92	2.65	7'-9 1/2"	105.52	none	2
13+75	-6 1/2"	33"	33"	97.95	97.95	33"	33"	94.20	94.20	3.67	2.65	7'-9 1/2"	104.52	none	2
14+95	-1 1/2"	33"	33"	97.71	97.46	33"	33"	93.96	93.71	4.50	3.01	6'-3"	105.52	none	1
16+60	-1 1/2"	36"	36"	96.45	96.45	36"	36"	93.38	93.38	4.50	3.01	7'-6 1/2"	106.12	Conc.	1
18+75	-1"	36"	36"	95.86	95.86	36"	36"	92.95	92.95	4.50	3.01	6'-3 1/2"	106.02	Brick	1
19+75	-5"	36"	36"	94.56	94.56	36"	36"	92.75	92.75	4.50	3.01	6'-3 1/2"	106.12	none	1
21+50	-3"	36"	36"	93.91	93.51	36"	36"	92.40	92.40	4.50	3.01	5'-7 1/2"	106.02	none	1
22+65	0"	36"	36"	92.82	92.82	36"	36"	92.17	92.17	4.50	3.01	5'-1 1/2"	106.02	none	1
24+60	+2"	36"	36"	91.65	91.65	36"	36"	91.78	91.78	4.50	3.01	4'-1 1/2"	105.04	none	1

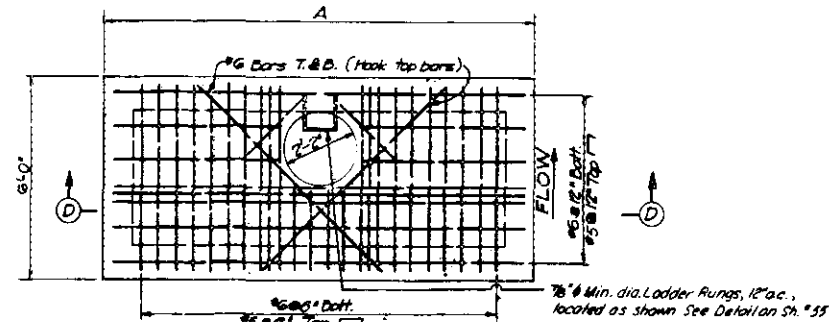
Note: Positive angles are to right in direction of flow and negative to left. Actual angles will depend on actual alignment of drain

Record Drawing

Contract No. DA-19-016 CIV ENG 64-19



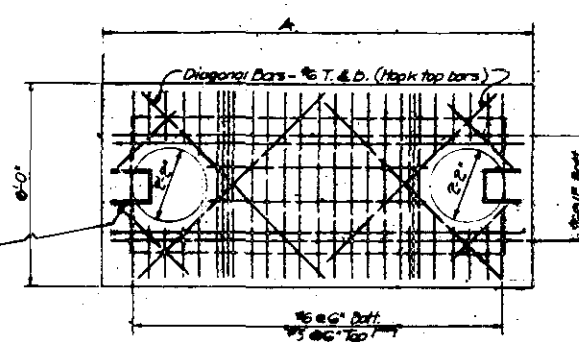
GREEN ENGINEERING APPLIANCE, INC. BOSTON, MASS. ARCHITECT-ENGINEER		U.S. ARMY ENGINEER DISTRICT, NEW ENGLAND CORPS OF ENGINEERS BOSTON, MASS.	
DESIGNED BY: [Signature] CHECKED BY: [Signature] APPROVED BY: [Signature]		CHICOPEE RIVER FLOOD CONTROL CHICOPEE FALLS MANHOLE DETAILS NO. 1	
CHICOPEE RIVER		MASSACHUSETTS	
DATE: APRIL 1963		SCALE: AS SHOWN (SEE NOTE 10-00-03-03-03)	
DRAWING NUMBER: CT-5885		SHEET 12	



TYPICAL - M.H. AT STA. 14+95

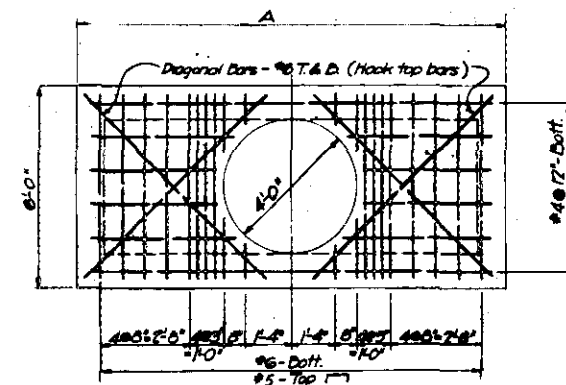
SCALE: 1/2" = 1'-0"

MAN-HOLE DIMENSIONS								
570	A	B	C	D	E	F	G	H
3'-0"	9 11	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
4'-0"	10	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
5'-0"	11	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
6'-0"	12	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
8'-0"	14	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
10'-0"	16	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
12'-0"	18	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
14'-0"	20	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
16'-0"	22	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
18'-0"	24	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
20'-0"	26	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
22'-0"	28	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
24'-0"	30	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
26'-0"	32	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
28'-0"	34	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"
30'-0"	36	5'-3"	3'-0"	4'-3"	3'-10"	2'-6"	6'-0"	7'-0"



TYPICAL - M.H. AT STA. 3+00, 4+50, 6+50, 8+50, 10+50.

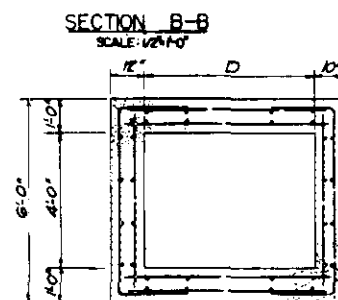
12+50, 13+75



TYPICAL - M.H. AT STA. 16+60, 18+75, 19+75.

21+50, 22+65, 24+60

SCALE: 1/2" = 1'-0"



SECTION C-C

SCALE: 1/2" = 1'-0"



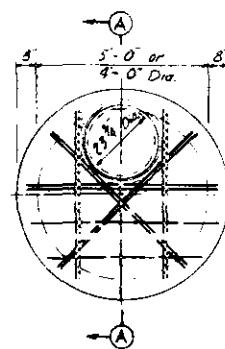
GRAPHIC SCALE

1/2" x 1" x 3"

### Record Drawing

Contract No. DA-19-016-CIV ENG 64-19

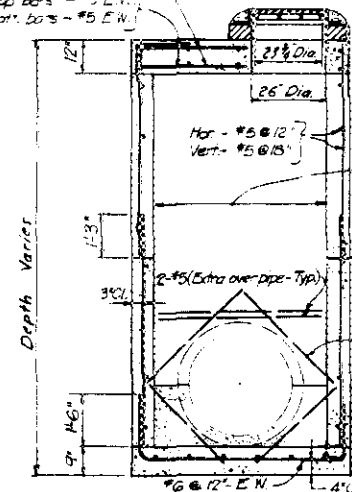
[illegible]



PLAN OF MANHOLE  
PLAN OF PRESSURE MANHOLE SIMILAR

NOTE:  
See Sheet No. 36 for Vent at  
M.H. with Boiler Blow Down  
Connection.

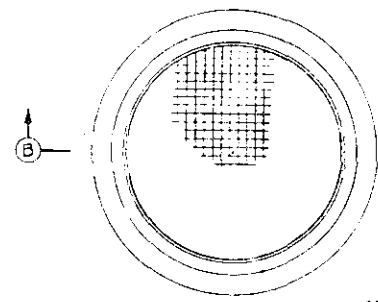
For single manhole need 2 R.R. track  
Use #6 @ 12" - Butt bars, #5 @ 12" top bars  
Top bars - #5 E.W.  
Butt bars - #5 E.W.



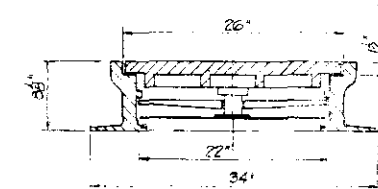
SECTION A-A

BOTTOM LAB  
FOR MANHOLES OVER 20'-0" DEEP

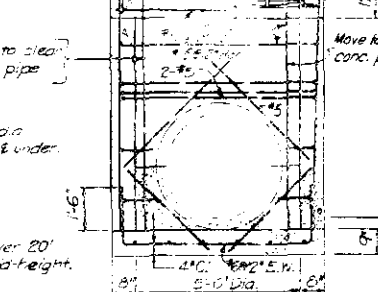
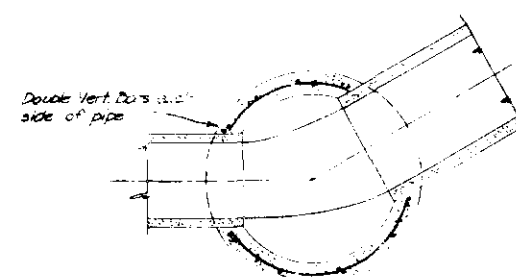
STANDARD 4'-0" & 5'-0" DIA. MANHOLES  
SCALE: 1/2"=1'-0"



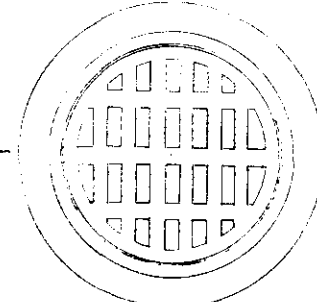
PLAN



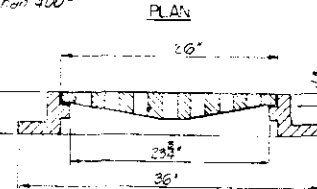
SECTION C-C

MANHOLE FRAME & COVER  
SCALE: 1/2"=1'-0"SECTION THROUGH PRESSURE MANHOLE  
SCALE: 1/2"=1'-0"

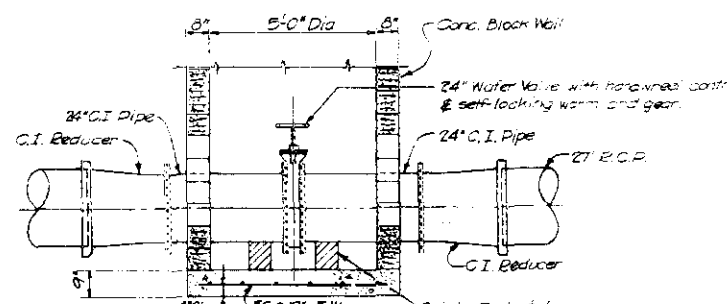
TYPICAL MANHOLE CHANNELING



PLAN



SECTION C-C

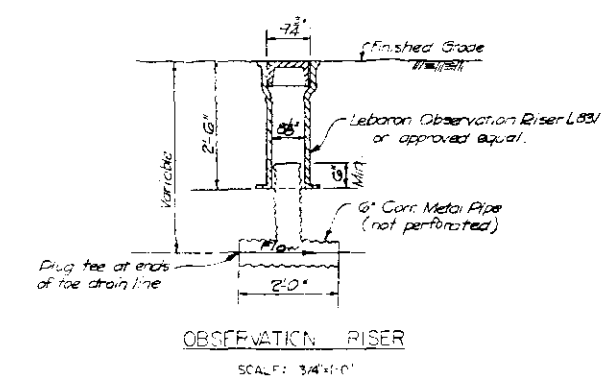
MANHOLE FRAME & COVER  
SCALE: 1/2"=1'-0"

Note: This manhole to be same as Sect. A-A except  
as noted.

TEMPORARY VALVE MANHOLE

AT STA. 1+50  
SCALE: 1/2"=1'-0"

NOTE:  
Angular changes in direction shall be made  
by bevelling the ends of the concrete pipe or  
providing suitable fittings. Provide concrete  
thrust blocks at changes in direction.



OBSERVATION RISER

SCALE: 3/4"=1'-0"

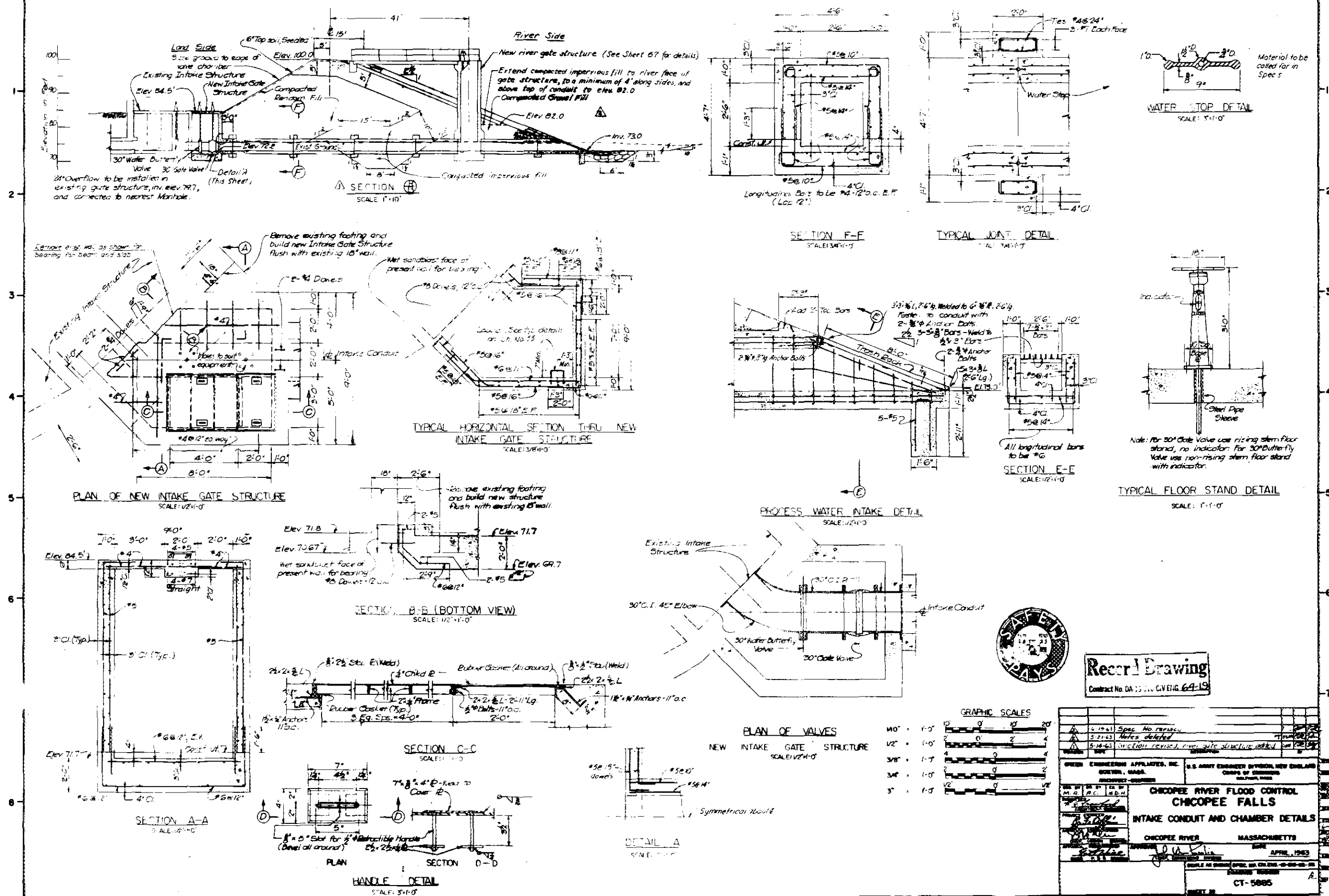


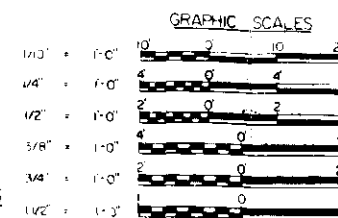
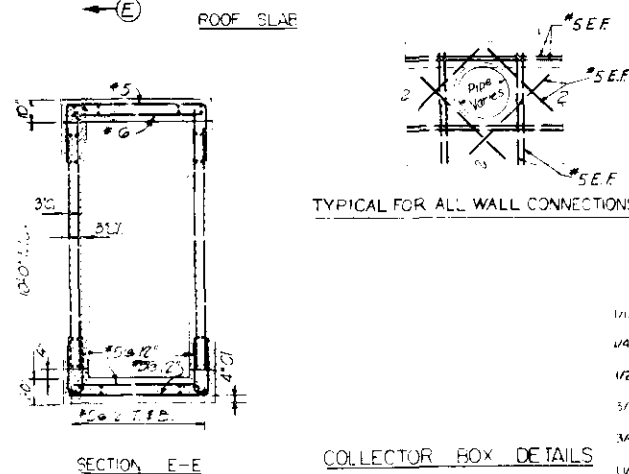
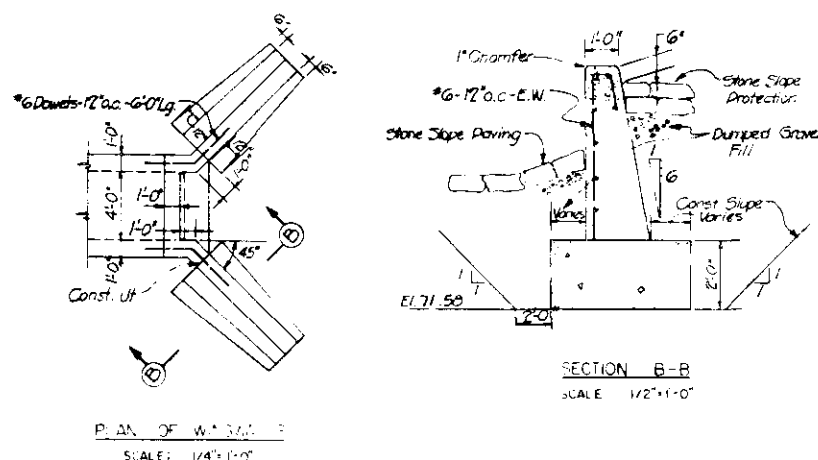
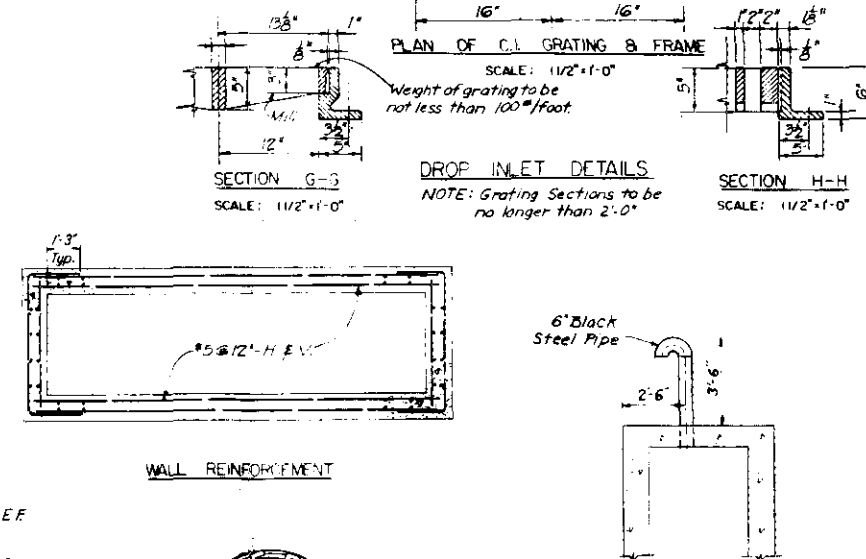
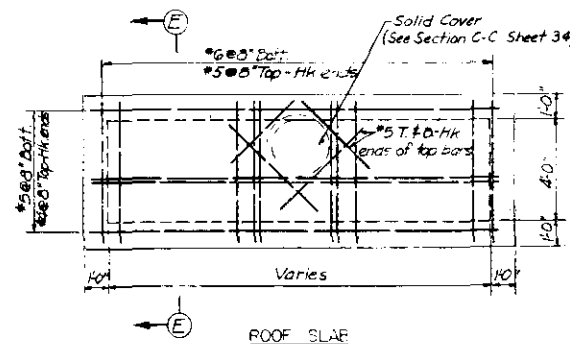
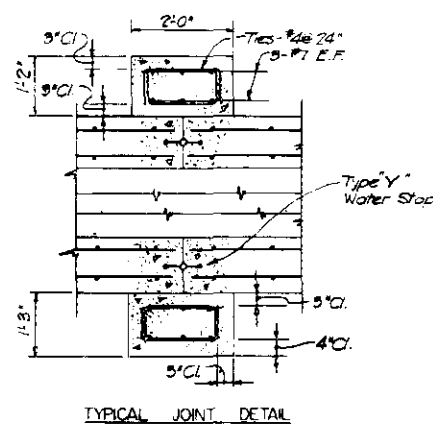
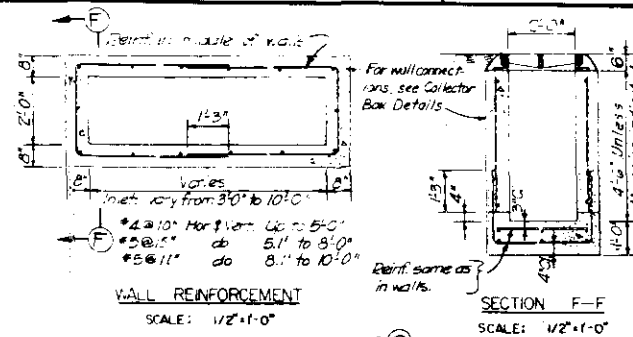
GRAPHIC SCALES

1/2"=1'-0"  
3/4"=1'-0"

Record Drawing  
Contract No. DA-19-016 CIV ENG. 64-19

GREEN ENGINEERING APPLIANTS, INC. BOSTON, MASS. ARCHITECT-ENGINEER		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS WALTON, MASS.	
CHICOPEE RIVER FLOOD CONTROL CHICOPEE FALLS MANHOLE DETAILS NO. 3		CHICOPEE RIVER MASSACHUSETTS	
DATE APRIL 1963		SCALE AS SHOWN SPEC. NO. CIV ENG. 64-19-93	
DRAWING NUMBER CT-5885		SHEET 21	





VENT FOR COLLECTOR BOXES  
WITH STEAM CONNECTIONS

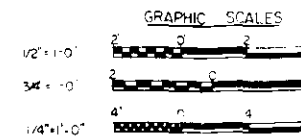
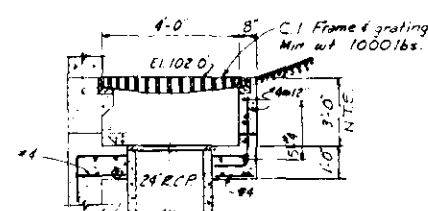
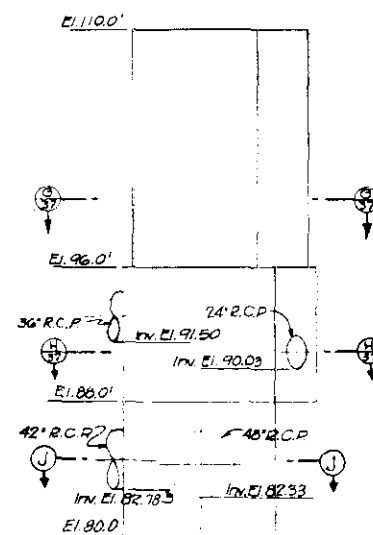
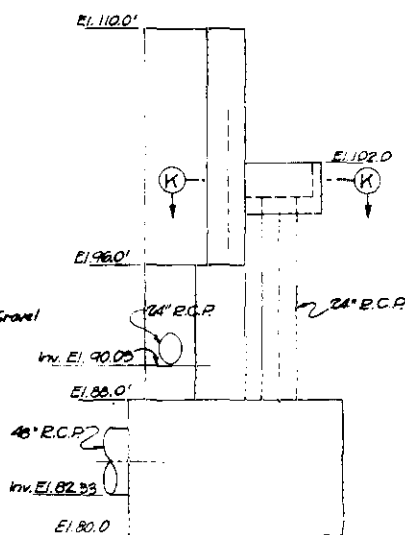
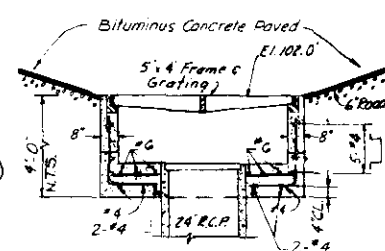
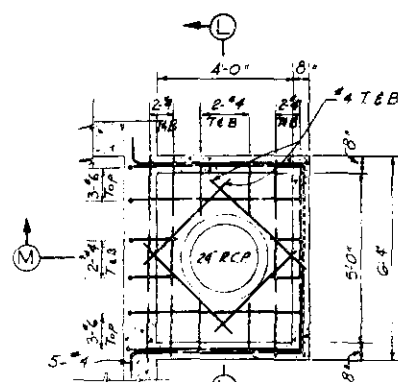
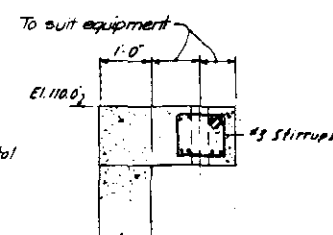
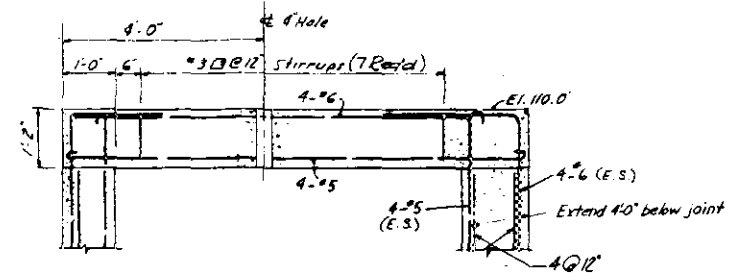
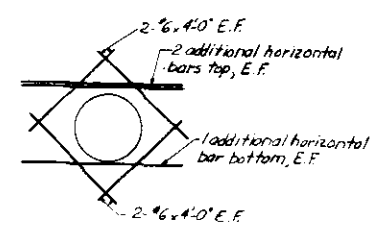
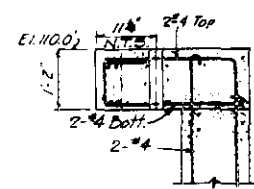
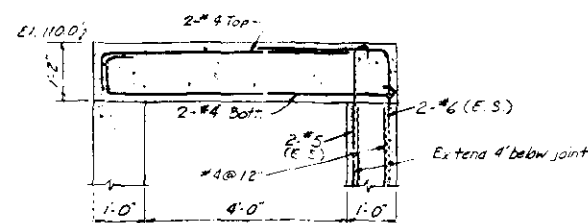
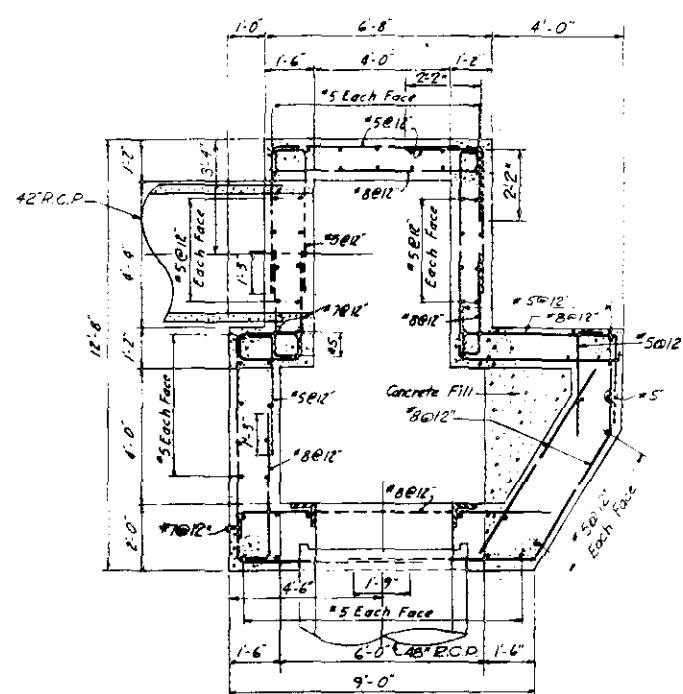
**Record Drawing**

SCALE: 3/8"=1'-0"

Contract No. DA-19-016 CIV ENG 64-19

10-2-63	Note added		
10-2-63	Spec. No revised		
5-14-63	Section to follow cover without details		
10-2-63	Section revised, final structure same		
REVISED	DATE	DESCRIPTION	
GREEN ENGINEERING APPLIATES, INC. ROSTON, MASS. ARCHITECT - ENGINEER		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS BILTMAN, MASS.	
DES. BY M.D. AC	CH. BY H.D.F.	CHICOPEE FLOOD CONTROL CHICOPEE FALLS MISCELLANEOUS DETAILS CONDUTS, COLLECTOR BOXES, AND DROP INLET CHICOPEE RIVER MASSACHUSETTS DATE APRIL, 1963	
NOTED			
REVISIONS			
APPROVED			
CHECK P.E. MARKS		SCALE AS SHOWN SPEC. NO. CH. 000-10 CH. 00-1 DRAWING NUMBER CT-5885	





**Record Drawing**  
Contract No. DA-13-016 DIV ENG 64-19

GREEN ENGINEERING APPLIANCE, INC. BOSTON, MASS. ARCHITECT-ENGINEER		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	
CHICOPEE RIVER FLOOD CONTROL CHICOPEE FALLS GATE STRUCTURE DETAILS NO. 2			
CHICOPEE RIVER		MASSACHUSETTS	
DATE		APRIL, 1963	
SCALE AS SHOWN SPEC. NO. CIV. ENG. 10-010-01-01		DRAWING NUMBER	
CT-5885		SHEET 30	



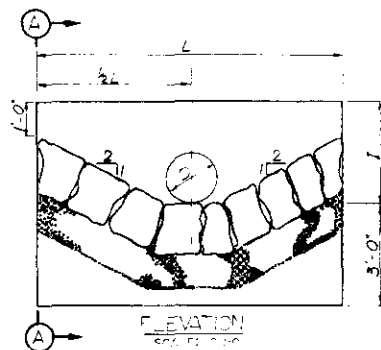
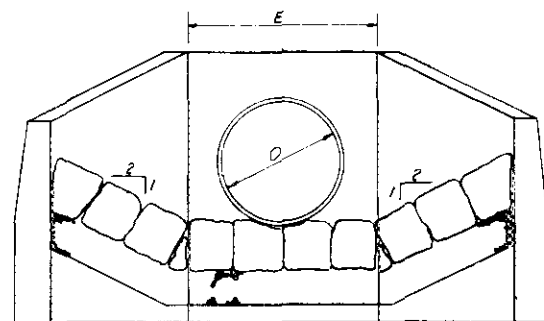
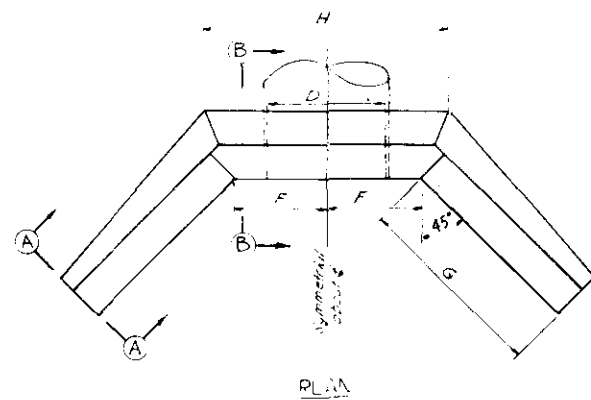
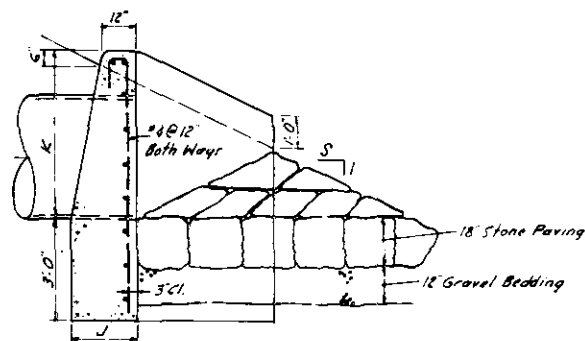


TABLE OF DIMENSIONS

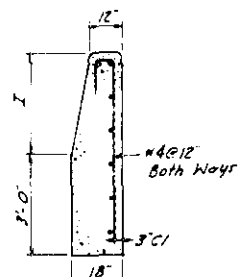
D	L	I
15'	9'-3"	3'-0"
21'	10'-6"	3'-3"



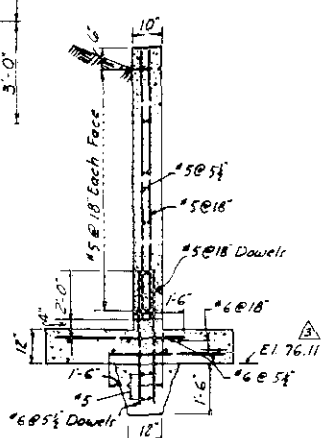
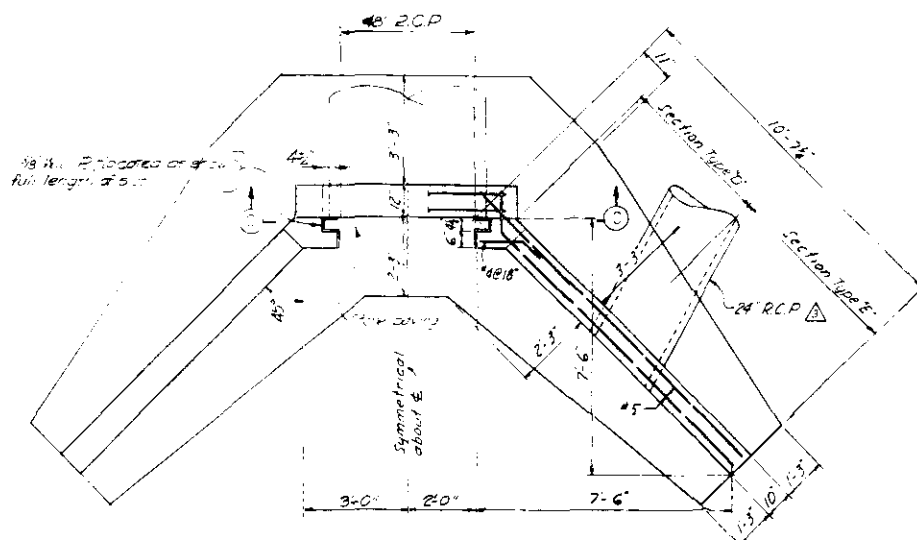
SCALE: 1/2"=1'-0"

TABLE OF DIMENSIONS

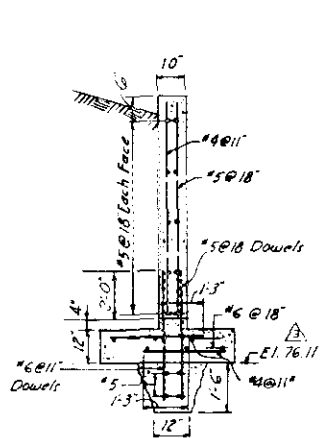
D	E	F	G	H	I	J	K	S
30'	4'-6"	2'-3"	5'-4"	5'-11"	2'-6"	1'-9"	4'-0"	2'-4"
42'	5'-6"	2'-9"	5'-8"	7'-2"	3'-0"	2'-0"	5'-0"	2'



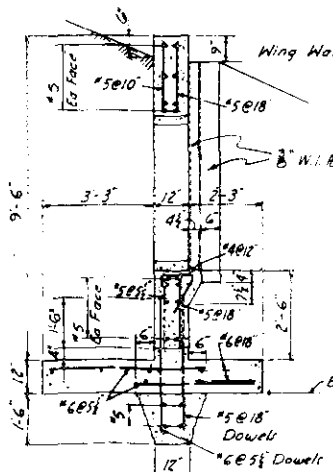
SCALE: 1/2"=1'-0"



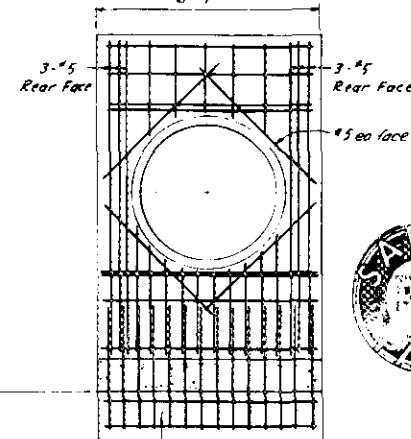
SCALE: 1/2"=1'-0"



SCALE: 1/2"=1'-0"



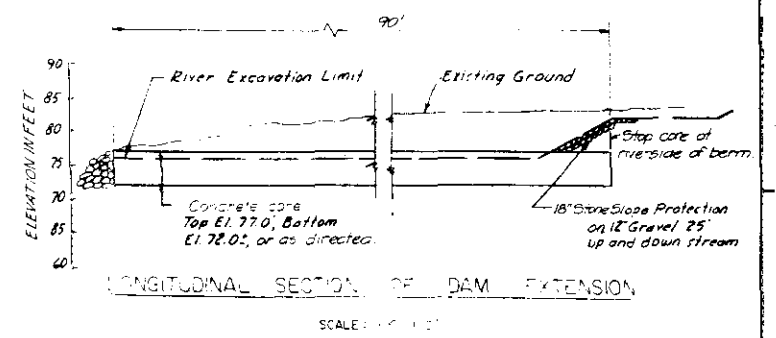
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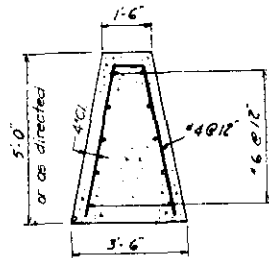
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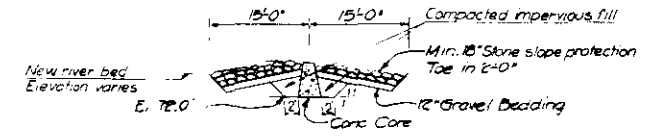
Record Drawing  
Contract No. DA-13-018-ENG 64-19



SCALE: 1/2"=1'-0"



SCALE: 1/2"=1'-0"



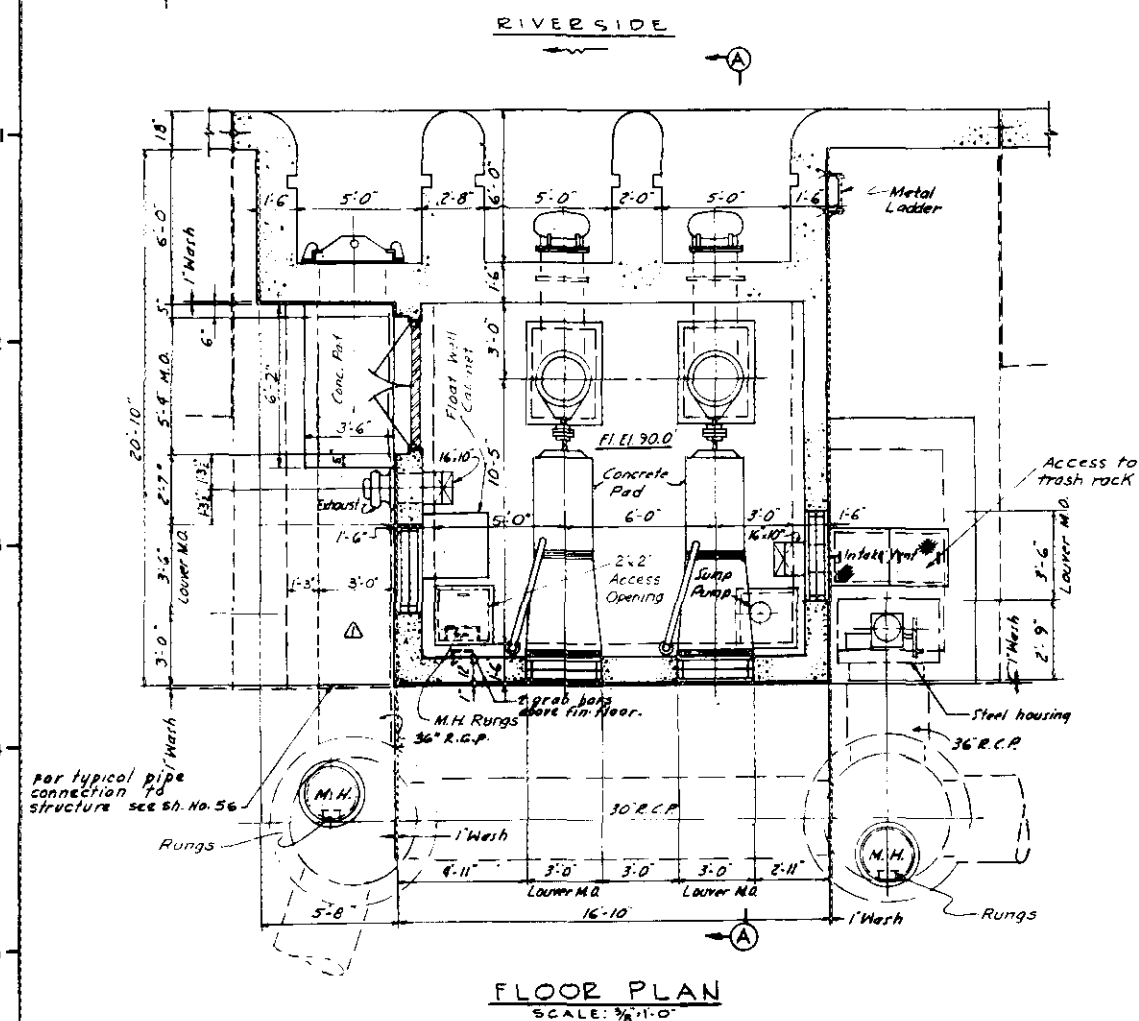
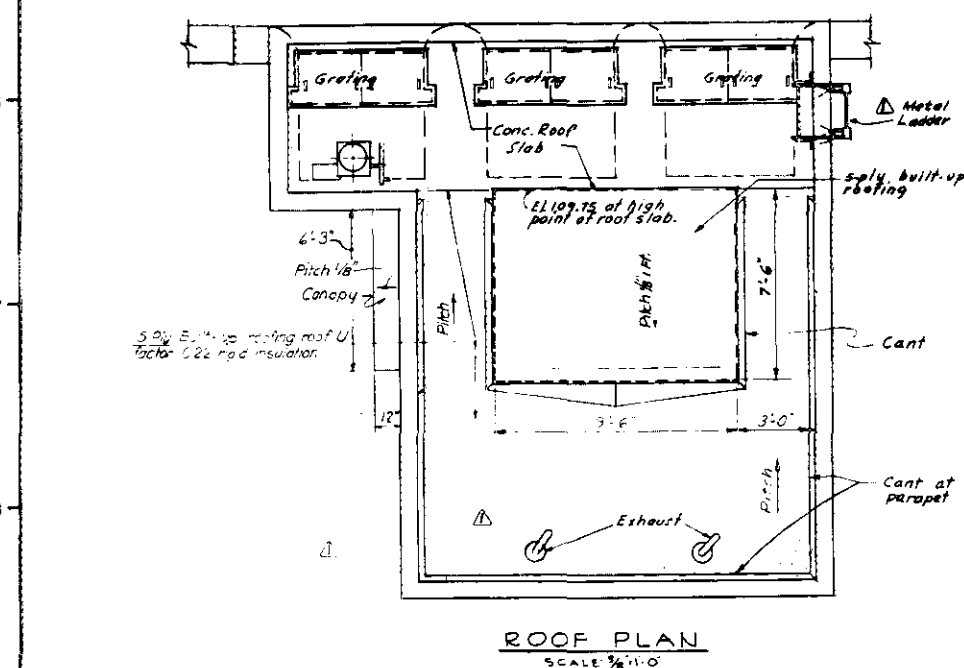
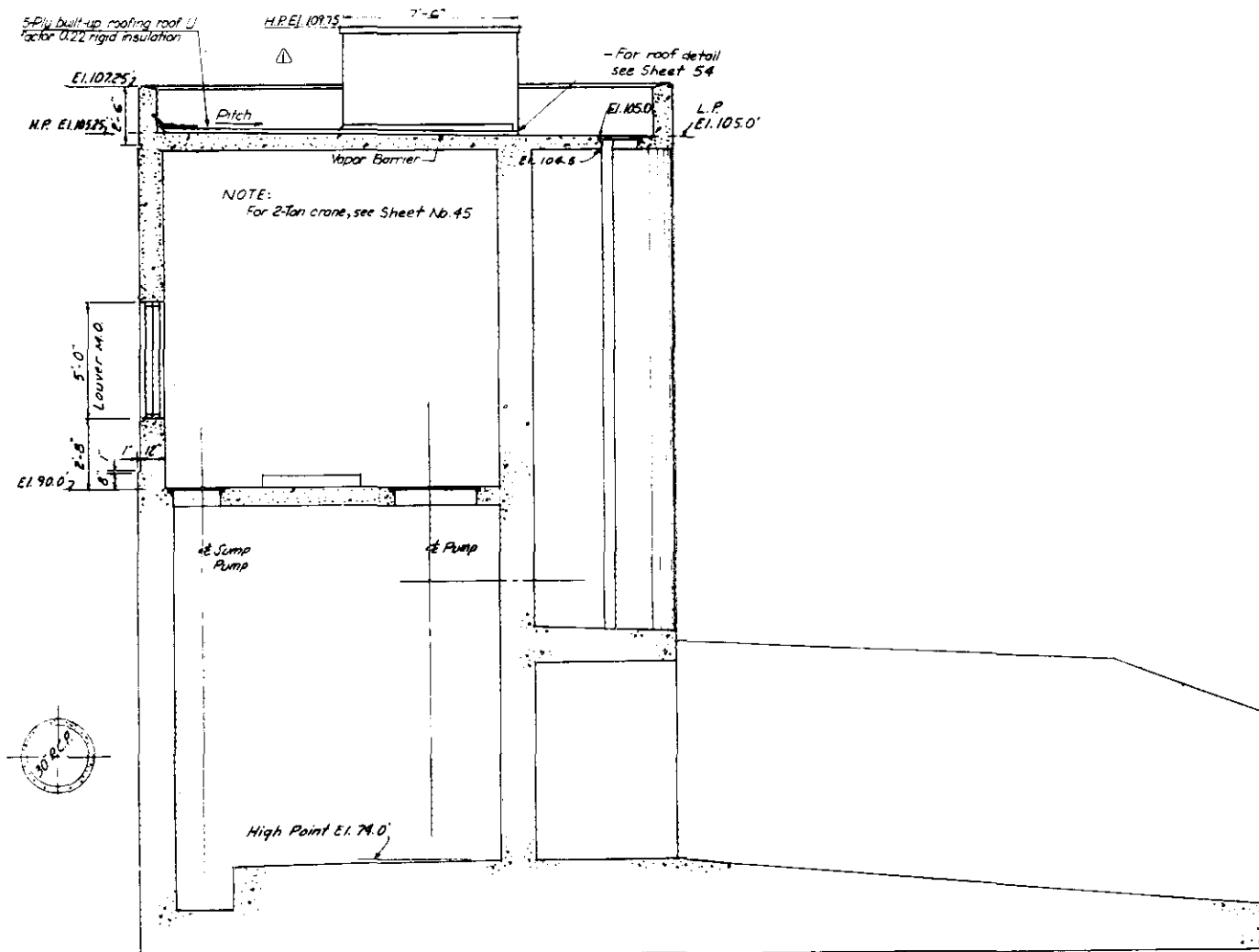
SCALE: 1/2"=1'-0"

NOTE:  
Stone paving shall extend from the headwall to the end of the stone toe berm, or to a point of least ten feet from the toe of bank along the river. Bottom the width of the stone paving shall equal the headwall length or the distance between the ends of the wingwalls.

GRAPHIC SCALES



GREEN ENGINEERS APPLIANTS, INC. BOSTON, MASS. ARCHITECT-ENGINEER		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS MILITARY, MASS.	
CHICOPEE RIVER FLOOD CONTROL CHICOPEE FALLS MISCELLANEOUS DETAILS HEADWALLS AND DAM EXTENSION CHICOPEE RIVER MASSACHUSETTS			
DESIGNED BY: [Signature] CHECKED BY: [Signature] DATE: APRIL 1963		SCALE AS SHOWN SPEC. NO. CH-ENG-10-60-63-25 DRAWING NUMBER CT-5885	

FLOOR PLAN  
SCALE: 1/8"=1'-0"ROOF PLAN  
SCALE: 1/8"=1'-0"SECTION A-A  
SCALE: 1/8"=1'-0"

Record Drawing

Contract No. DA-19-016 CIV ENG 64-19

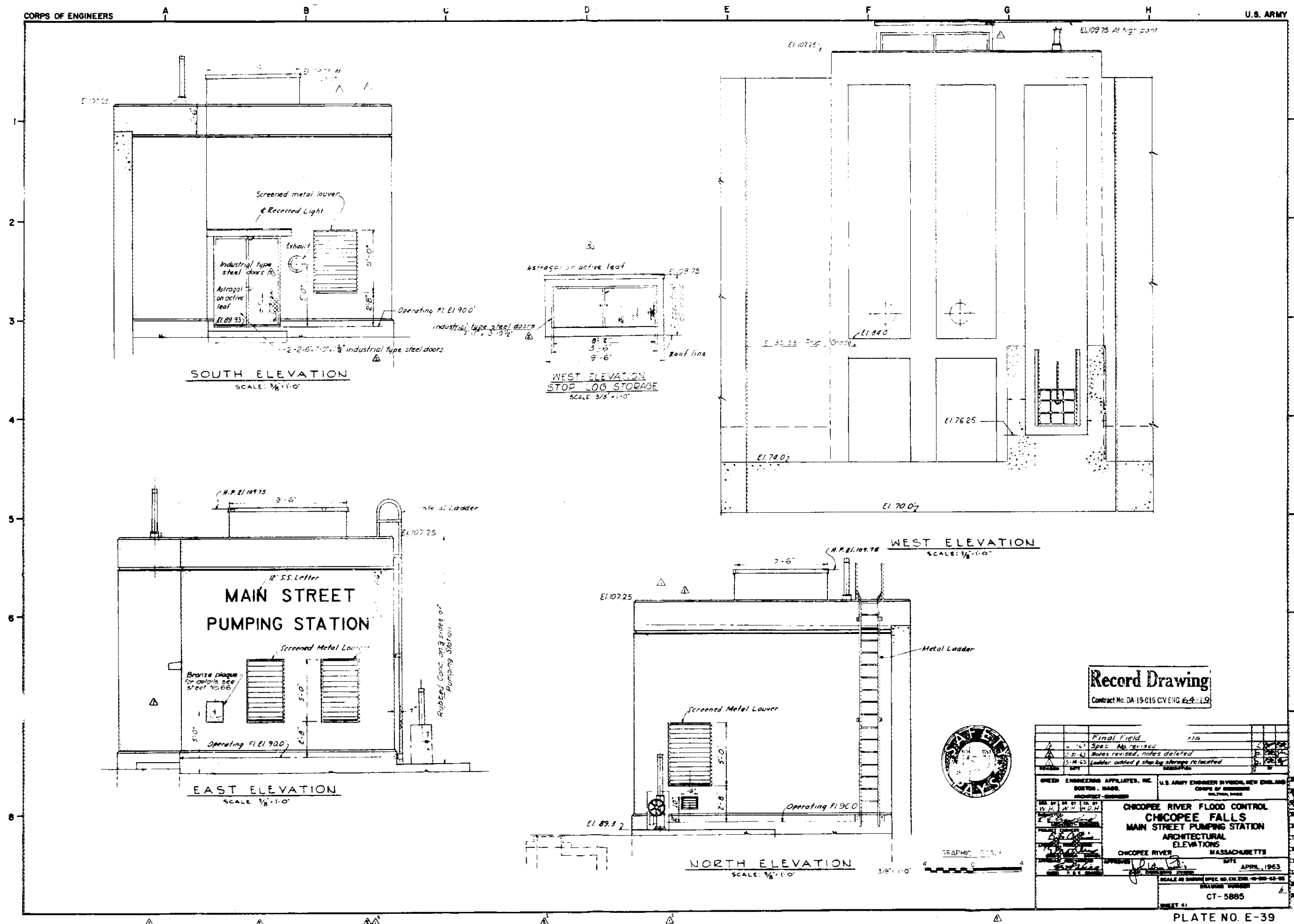


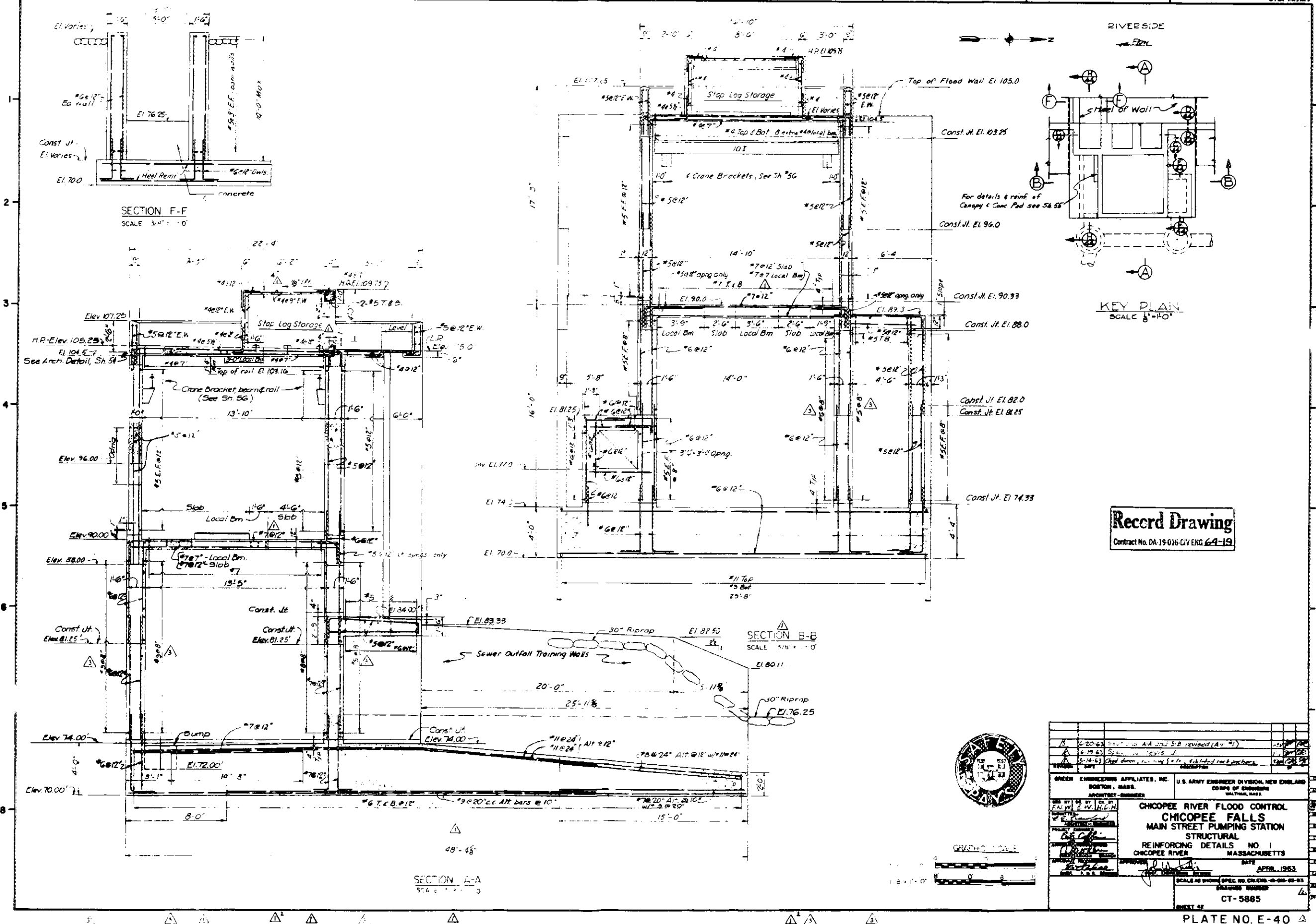
Final Field Corrections	
6-19-63 Spec. No. Revised	
5-14-63 Metal ladder added, roof hatch deleted	
DATE	DESCRIPTION

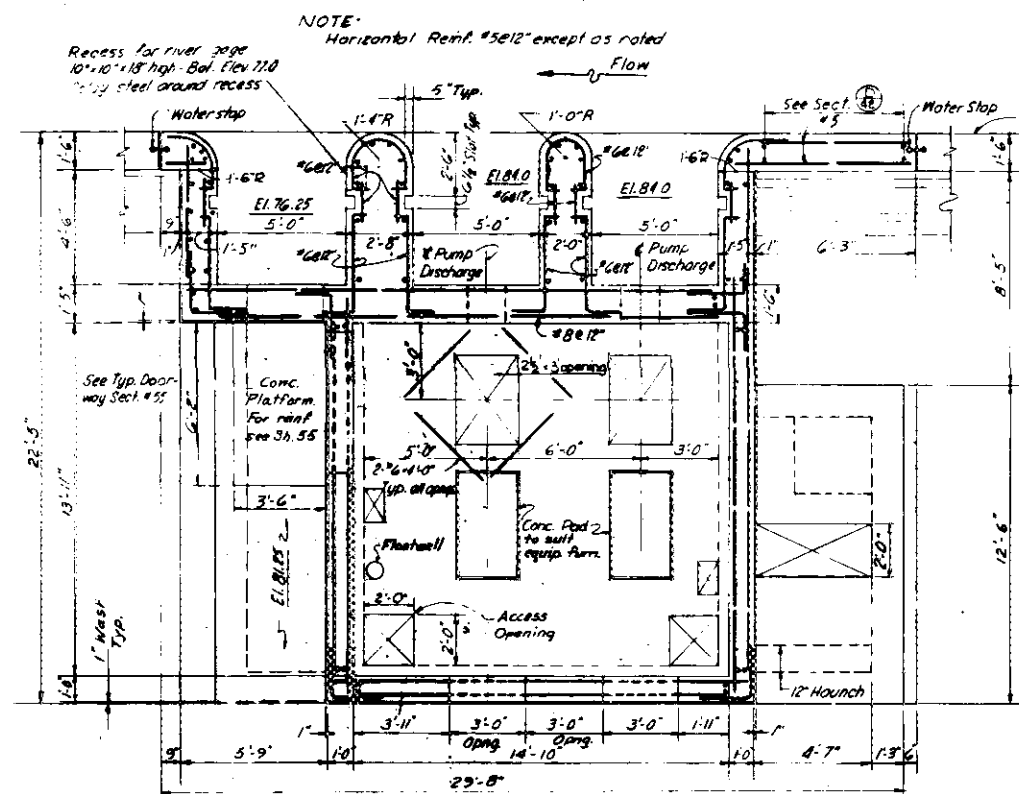
GREEN ENGINEERING AFFILIATES, INC.	
BOSTON, MASS.	
ARCHITECT-ENGINEER	

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND	
BOSTON, MASS.	
CORPS OF ENGINEERS	
WALTHAM, MASS.	

CHICOPEE RIVER FLOOD CONTROL	
CHICOPEE FALLS	
MAIN STREET PUMPING STATION	
ARCHITECTURAL	
PLANS AND SECTION	
CHICOPEE RIVER MASSACHUSETTS	
DATE	APRIL, 1963
SCALE AS SHOWN SPEC. NO. CIV. ENG. 64-19	
DRAWING NUMBER	CT-5885
SHEET 40	

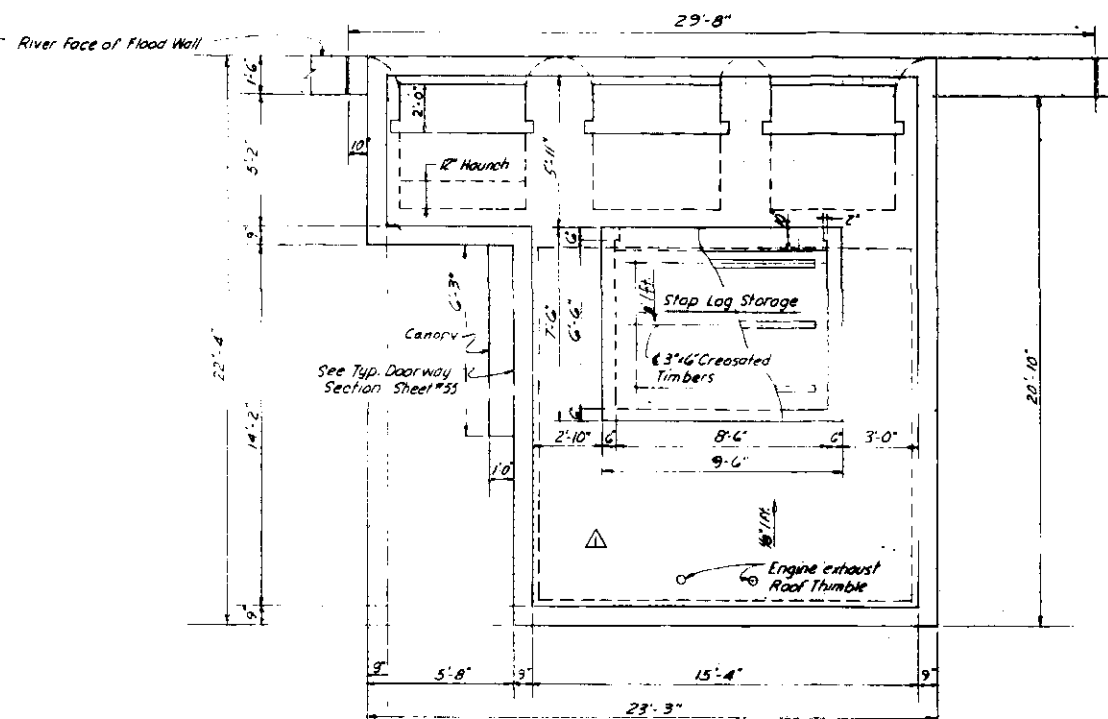






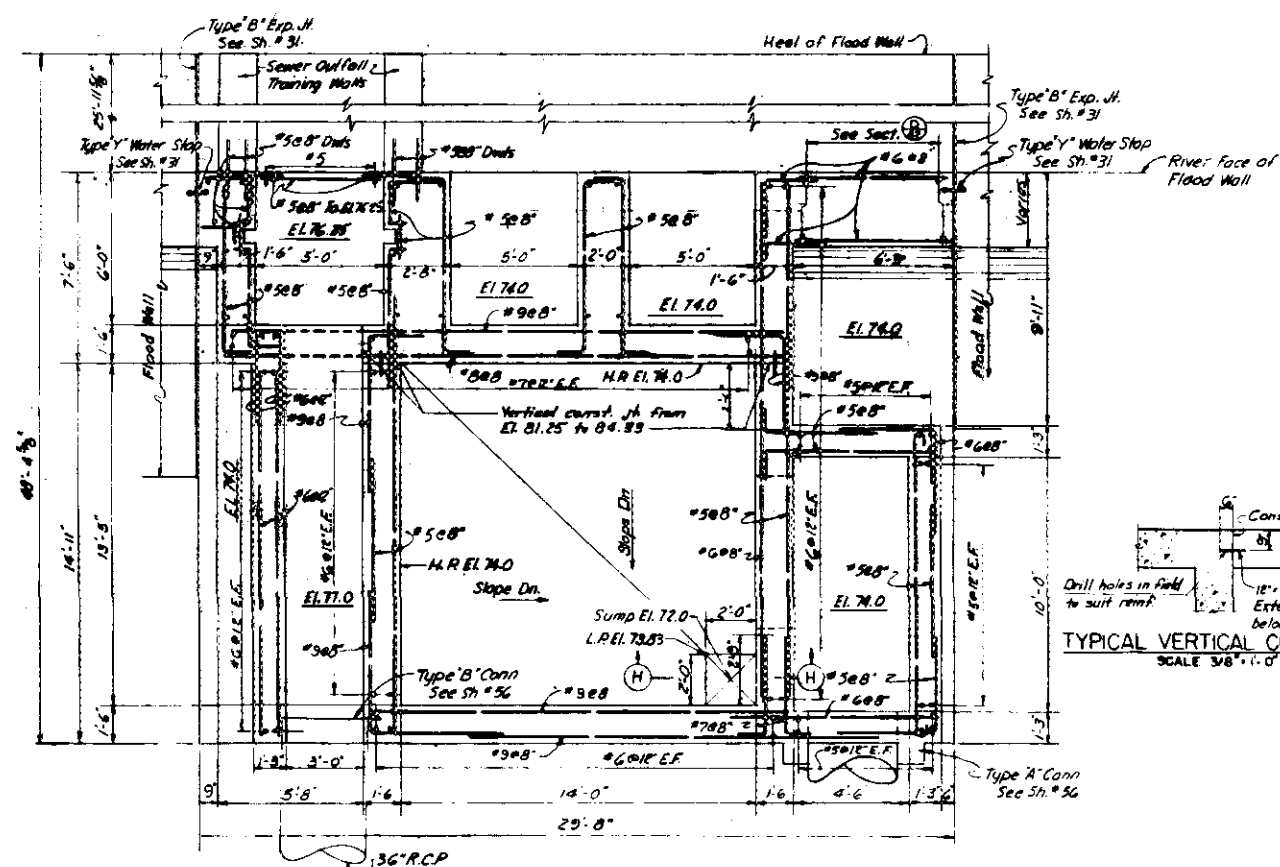
PLAN OPERATING FLOOR EL 92.00

SCALE  $\frac{3}{8}" = 1'-0"$



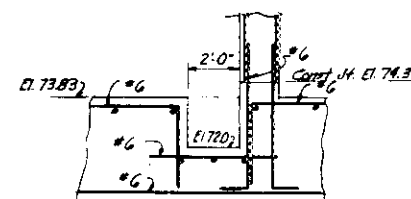
ROOF PLAN

SCALE 3/8" = 1' - 0"



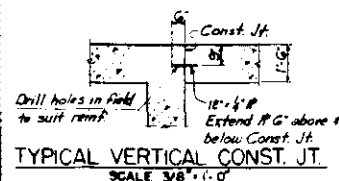
FOUNDATION PLAN EL 78.00 A<sub>1</sub> A<sub>3</sub>

SCALE: 3/8" = 1'-0"



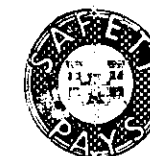
SECTION 11-H

56.1 - 100 - 0.0



below Const. Jt.  
TYPICAL VERTICAL CONST. JT

SCALE 3/8" = 1'-0"



7-1-1961 9:00 A.M.

305-1-6

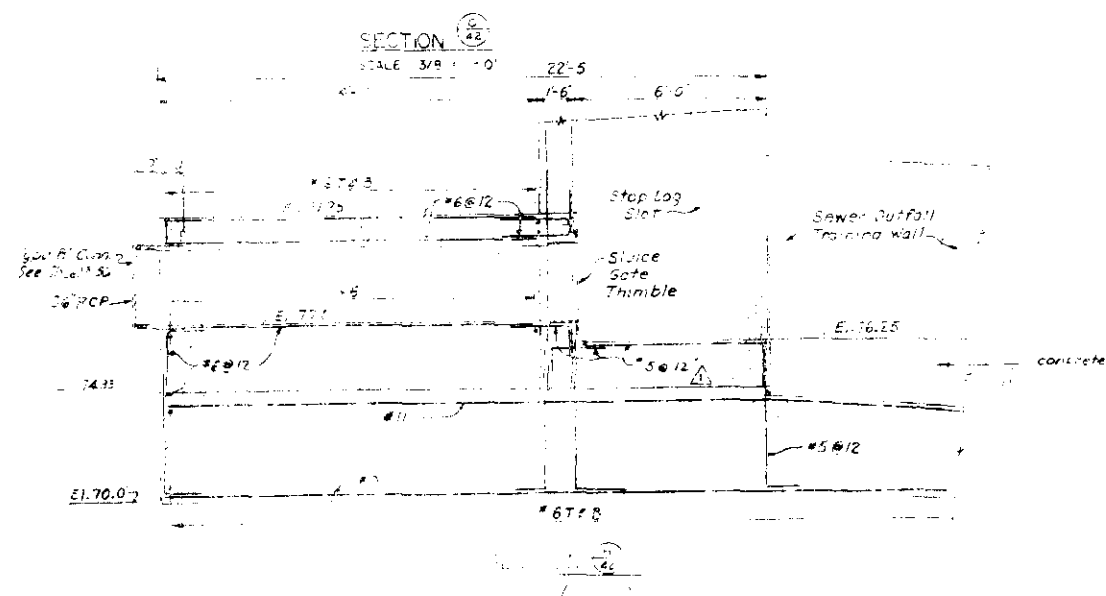
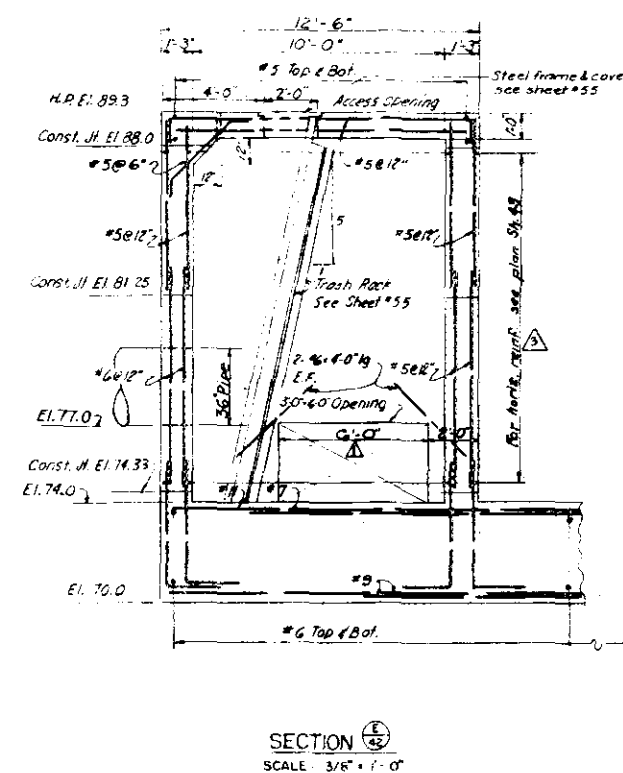
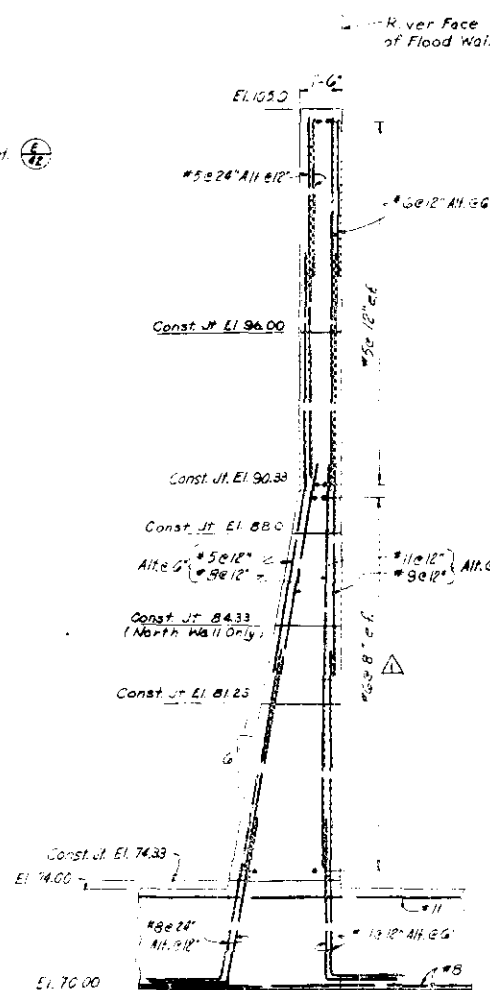
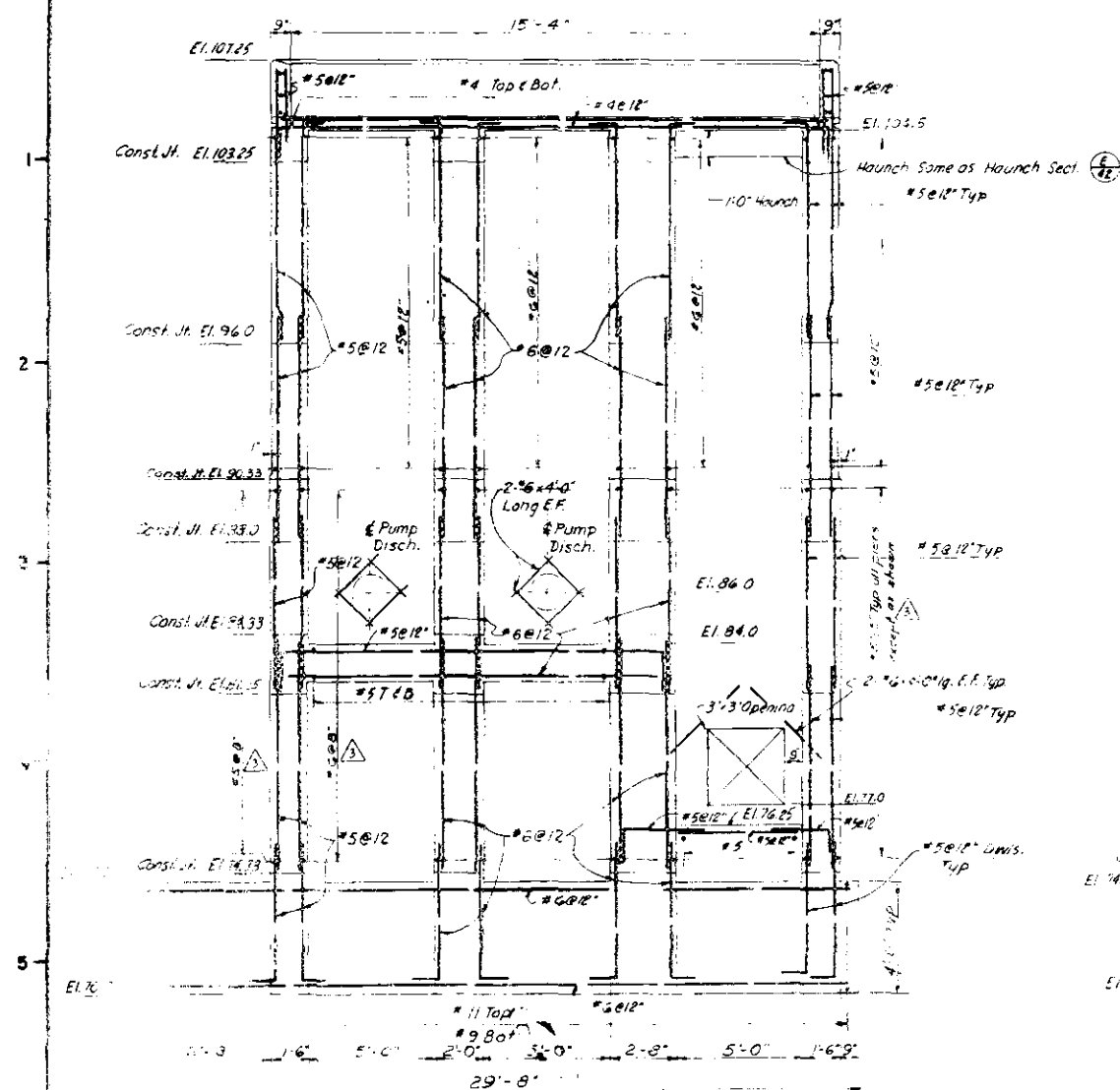
**Record Drawing**

Contract No. DA-19-016-CIV ENG 64-19

NOTES:

1. Reinforcement shown is schematic only and is intended to show the principal faces reinforced.
2. Vertical reinforcement shall be placed inside horizontal reinforcement in walls and long span reinforcement; inside short span reinforcement in slabs.
3. Minimum splices of reinforcement shall be  $24 \text{ dia.}$  of smaller bar.
4. Exposed corners shall have  $1'$  chamfer except as noted.
5. Minimum cover for reinforcement shall be  $4"$  bottom of base slab;  $3"$  top of base slabs and walls below grade, each face;  $2"$  exterior walls above grade, each face;  $1\frac{1}{2}"$  floor beams, and  $3\frac{1}{4}"$  roof and floor slabs.
6. For details of miscellaneous details, see  $SH 58$ .
7. See note on  $SH 27$  for earth back-fill details.
8. Where horizontal reinf is terminated at openings in vertical walls, provide extra horizontal reinf at top and/or bottom. Extra reinf shall have an area equivalent to the terminated bars.

6-20-43	Foundation Plan revised (Am #1)	W. H. H. H.
6-19-43	Spec. No. revised	W. H. H. H.
5-21-43	NOTE added, rebar revised, hatch removed.	W. H. H. H.
DRAFT	DATE	REVISION
GREEN ENGINEERING APPLIANTS, INC. BOSTON, MASS.		U.S. ARMY ENGINEER DIVISION, NEW BEDFORD CORPS OF ENGINEERS WILTON, MASS.
ARCHITECT - ENGINEER		
<p>CHICOPEE RIVER FLOOD CONTROL CHICOPEE FALLS MAIN STREET PUMPING STATION STRUCTURAL REINFORCING DETAILS NO. 2 CHICOPEE RIVER MASSACHUSETTS</p> <p>APPROVED: <i>[Signature]</i> DATE: APRIL, 1963</p> <p>SCALE AS SHOWN (SPEC. ON ORDER - 0-100-23-53) DRAWING NUMBER</p> <p>CT - 5885</p>		



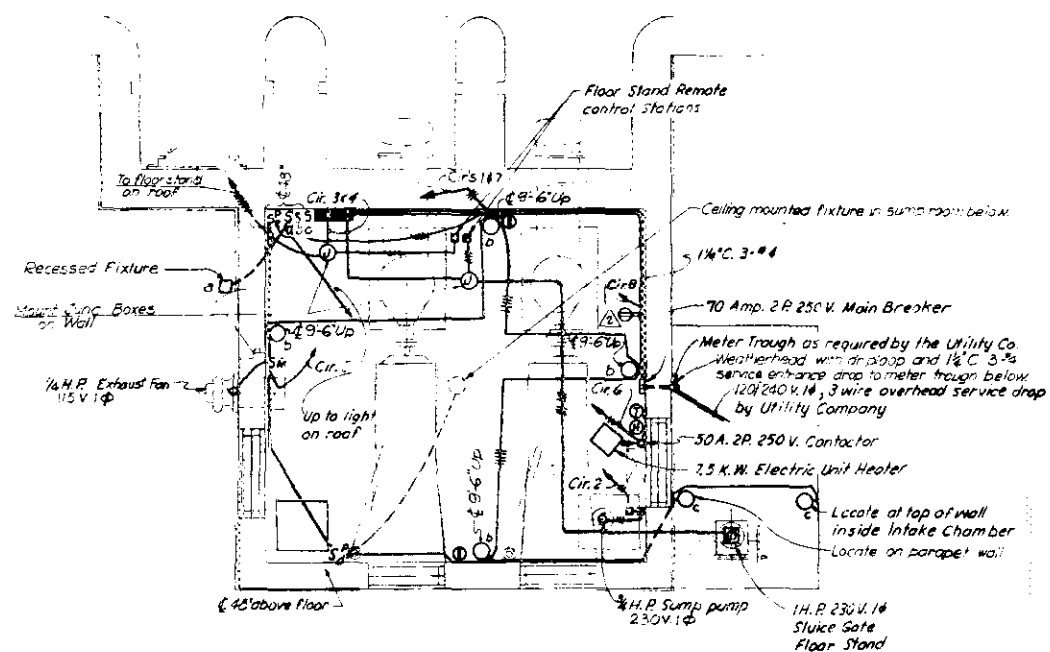
## Record Drawing

Contract No. DA-19-016-CIV ENG 64-19



10-20-63 10-21-63 10-22-63 10-23-63 10-24-63 10-25-63 10-26-63 10-27-63 10-28-63 10-29-63 10-30-63 10-31-63 11-01-63 11-02-63 11-03-63 11-04-63 11-05-63 11-06-63 11-07-63 11-08-63 11-09-63 11-10-63 11-11-63 11-12-63 11-13-63 11-14-63 11-15-63 11-16-63 11-17-63 11-18-63 11-19-63 11-20-63 11-21-63 11-22-63 11-23-63 11-24-63 11-25-63 11-26-63 11-27-63 11-28-63 11-29-63 11-30-63 12-01-63 12-02-63 12-03-63 12-04-63 12-05-63 12-06-63 12-07-63 12-08-63 12-09-63 12-10-63 12-11-63 12-12-63 12-13-63 12-14-63 12-15-63 12-16-63 12-17-63 12-18-63 12-19-63 12-20-63 12-21-63 12-22-63 12-23-63 12-24-63 12-25-63 12-26-63 12-27-63 12-28-63 12-29-63 12-30-63 12-31-63	Section revised (Am #1) Spec No. revised 10-21-63 10-22-63 10-23-63 10-24-63 10-25-63 10-26-63 10-27-63 10-28-63 10-29-63 10-30-63 10-31-63 11-01-63 11-02-63 11-03-63 11-04-63 11-05-63 11-06-63 11-07-63 11-08-63 11-09-63 11-10-63 11-11-63 11-12-63 11-13-63 11-14-63 11-15-63 11-16-63 11-17-63 11-18-63 11-19-63 11-20-63 11-21-63 11-22-63 11-23-63 11-24-63 11-25-63 11-26-63 11-27-63 11-28-63 11-29-63 11-30-63 12-01-63 12-02-63 12-03-63 12-04-63 12-05-63 12-06-63 12-07-63 12-08-63 12-09-63 12-10-63 12-11-63 12-12-63 12-13-63 12-14-63 12-15-63 12-16-63 12-17-63 12-18-63 12-19-63 12-20-63 12-21-63 12-22-63 12-23-63 12-24-63 12-25-63 12-26-63 12-27-63 12-28-63 12-29-63 12-30-63 12-31-63	10-20-63 10-21-63 10-22-63 10-23-63 10-24-63 10-25-63 10-26-63 10-27-63 10-28-63 10-29-63 10-30-63 10-31-63 11-01-63 11-02-63 11-03-63 11-04-63 11-05-63 11-06-63 11-07-63 11-08-63 11-09-63 11-10-63 11-11-63 11-12-63 11-13-63 11-14-63 11-15-63 11-16-63 11-17-63 11-18-63 11-19-63 11-20-63 11-21-63 11-22-63 11-23-63 11-24-63 11-25-63 11-26-63 11-27-63 11-28-63 11-29-63 11-30-63 12-01-63 12-02-63 12-03-63 12-04-63 12-05-63 12-06-63 12-07-63 12-08-63 12-09-63 12-10-63 12-11-63 12-12-63 12-13-63 12-14-63 12-15-63 12-16-63 12-17-63 12-18-63 12-19-63 12-20-63 12-21-63 12-22-63 12-23-63 12-24-63 12-25-63 12-26-63 12-27-63 12-28-63 12-29-63 12-30-63 12-31-63
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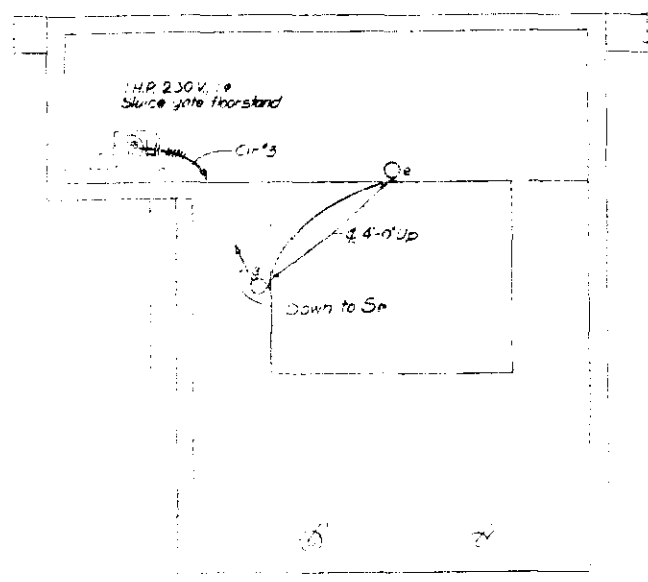


FLOOR PLAN

SCALE 3/8" = 1'-0"

## NOTE:

1. Bracket lighting fixtures shall be 150<sup>W</sup> and equal to Corps of Engineers drawing 40-06-04 sheet No 10 type V.G.-4
2. Ceiling lighting fixtures shall be 150<sup>W</sup> and equal to Corps of Engineers drawing 40-06-04 sheet No 11 type V.G.-2
3. Recessed fixture shall be 100<sup>W</sup> and equal to Benjamin Moe \*M-6660 with fiber-glass diffuser



ROOF PLAN

SCALE 3/8" = 1'-0"

PANEL BOARD SCHEDULE					
70 AMP. 120/240 VOLT 3 WIRE MAIN LUGS					
CIR. NO.	BRANCH BREAKER NO.	COND. WIRE	SERVICES	CONNECTED LOAD WATTS	
1	20 1	3/4" 2-12	LIGHTING	1200	
2	20 2	3/4" 3-12	PUMP PUMP	1400	
3	20 2	3/4" 2-12	FLOOR STAND	1400	
4	20 2	3/4" 2-12	FLOOR STAND	1400	
5	20 1	3/4" 2-12	EXHAUST FAN	300	
6	30 2	1/2" 3-6	UNIT HEATER	7500	
7	20 1	3/4" 2-12	RECEPTACLE	500	
8	20 2	3/4" 2-12	DEHUMIDIFIER	1200	
9	20 1		SPARE		
10	20 1		SPARE		
TOTAL				13,700	

LEGEND	
NEW	DESCRIPTION
■	PANELBOARD
○	WALL LIGHT OUTLET
⊕	DUPLEX CONVENIENCE OUTLET 20
⊙	JUNCTION BOX
⊗	THERMOSTAT 4 5-0"
⊕	HUMIDISTAT 4 5-0"
S	SINGLE POLE LIGHTING SWITCH
SW	MANUAL MOTOR SWITCH
M	MAGNETIC STARTER
D	DISCONNECT SWITCH
SP	SWITCH AND PILOT
d	INDICATES SWITCH CONTROL OF GULCH
—	BRANCH CIRCUIT CONDUIT AND WIRE
+	CROSS MARKS INDICATE NO. OF COND.
⊕	ELECTRIC MOTOR, H.P. AS INDICATED



GRAPHIC SCALE

3/8" = 1'-0"

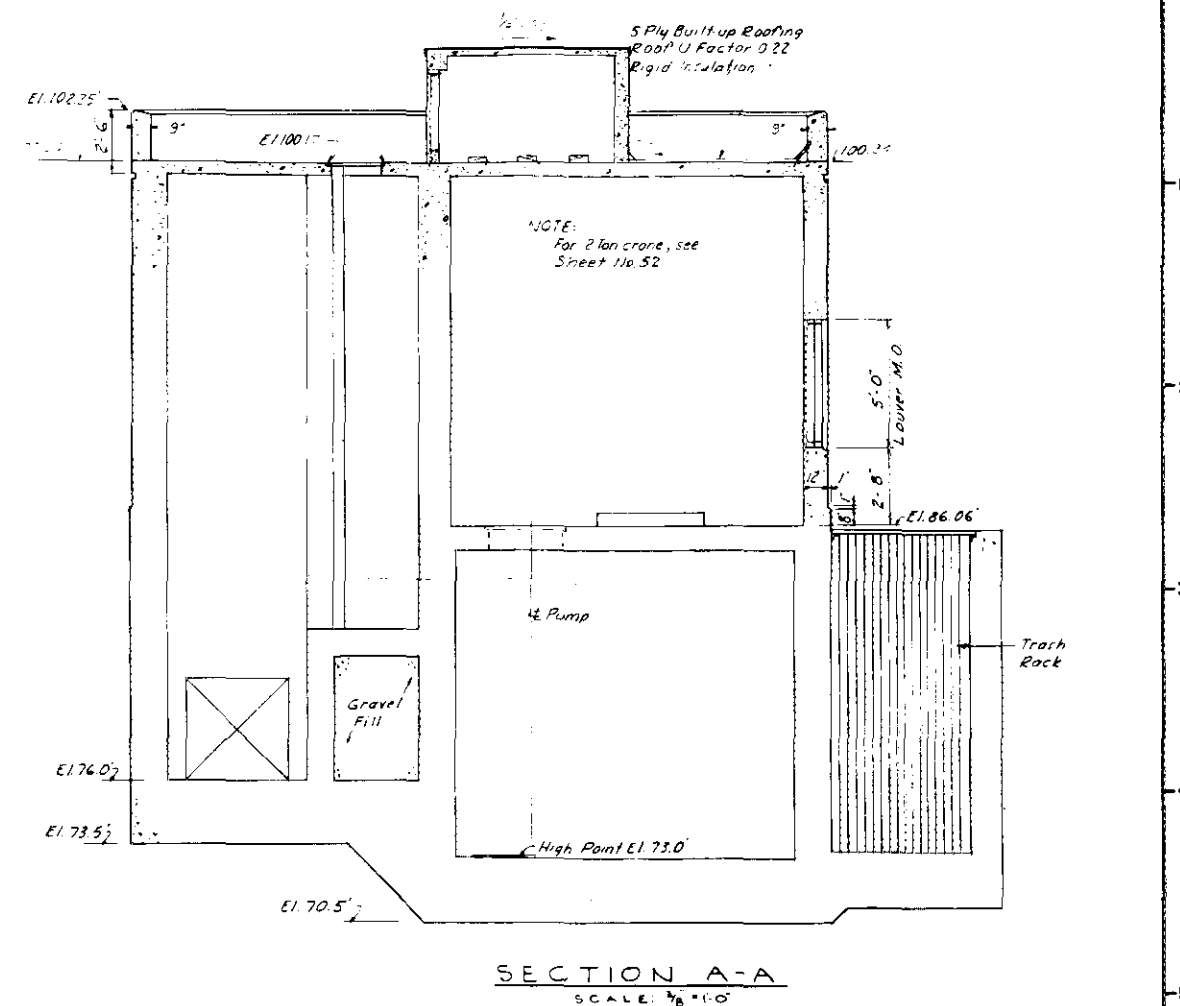
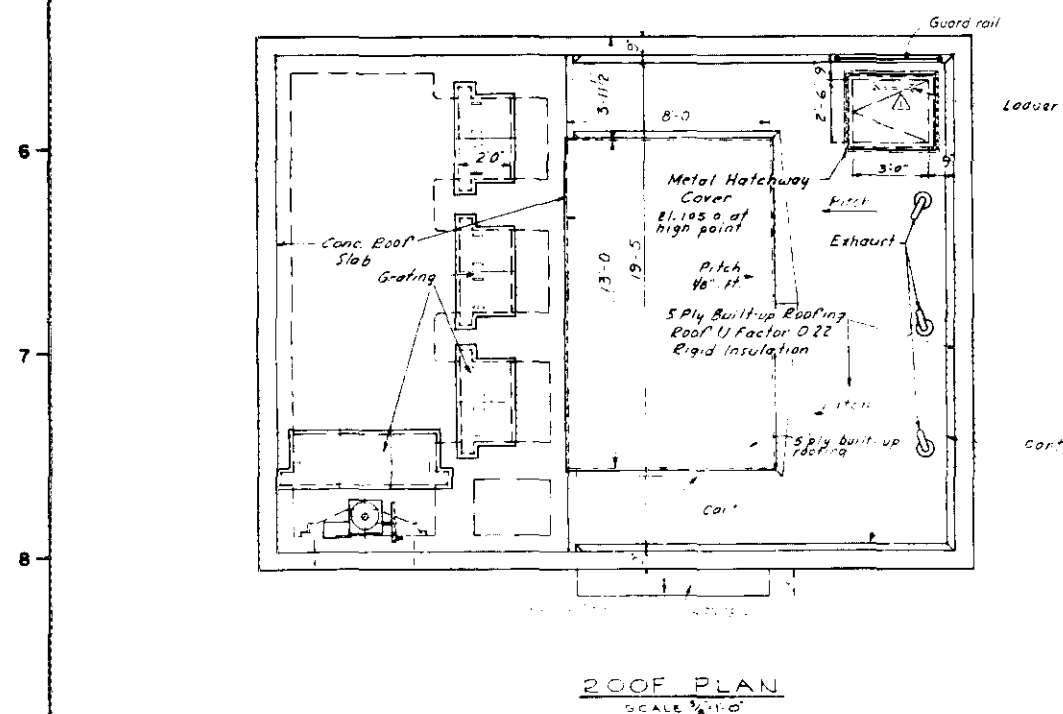
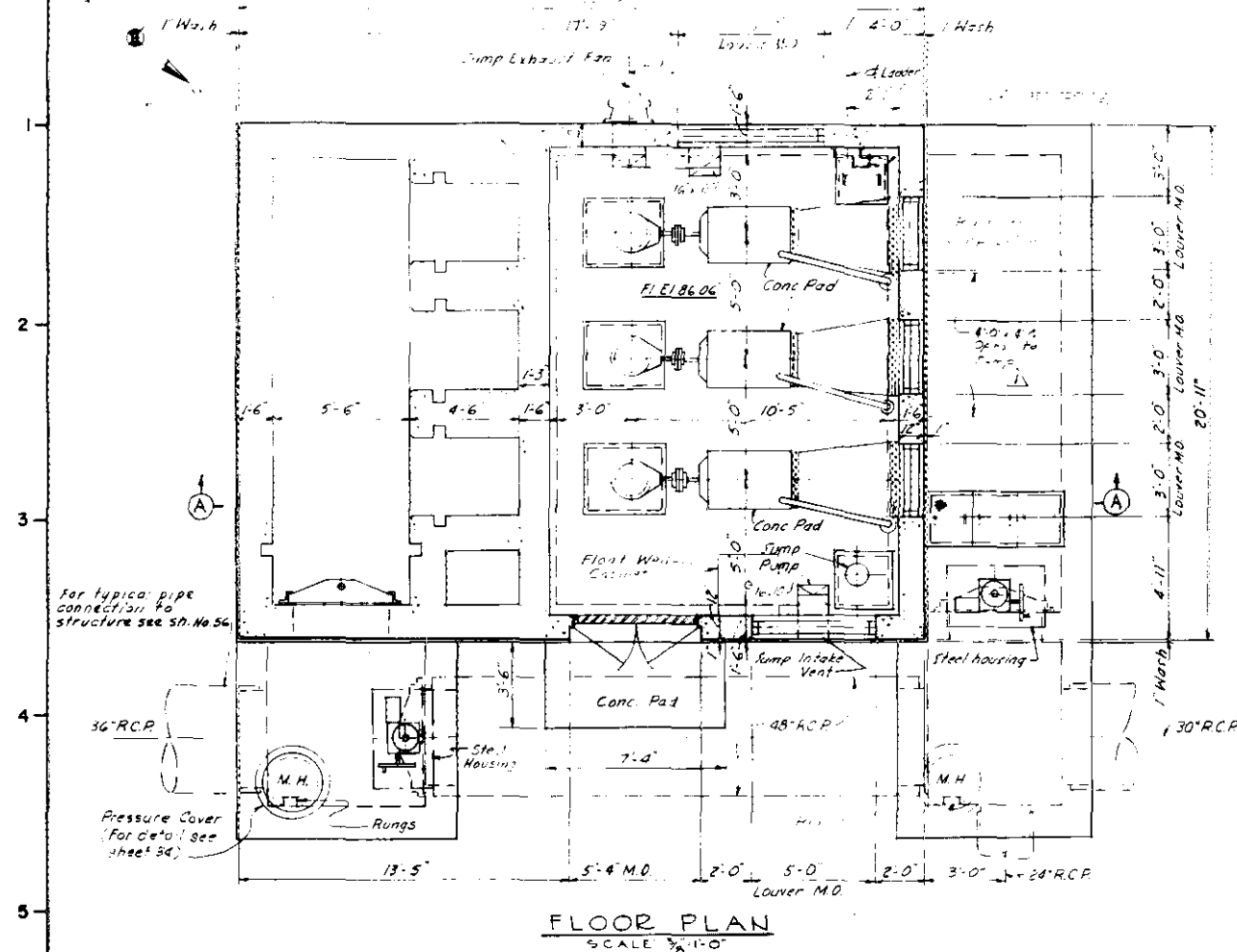
Record Drawing

Contract No. DA-13-016-DIVENS 64-19

Final Field Corrections		DATE		DESCRIPTION	
6-20-63 Dehumidifier added (Am #1)		10/1/63		10/1/63	
6-20-63 Spec No. revised		10/1/63		10/1/63	
GREEN ENGINEERING AFFILIATES, INC.		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND		BOSTON, MASS.	
ARCHITECT - ENGINEER		CORPS OF ENGINEERS		WALTHAM, MASS.	
CHICOPEE RIVER FLOOD CONTROL					
CHICOPEE FALLS					
MAIN STREET PUMPING STATION					
ELECTRICAL					
PLANS AND SECTION					
CHICOPEE RIVER, MASSACHUSETTS					
DATE		APRIL 1963		SHEET 49	
SCALE AS SHOWN SPEC. NO. CH. ENG. 40-06-04-93		EXTENDING NUMBER		CT-5885	

PLATE NO. E-44 Δ

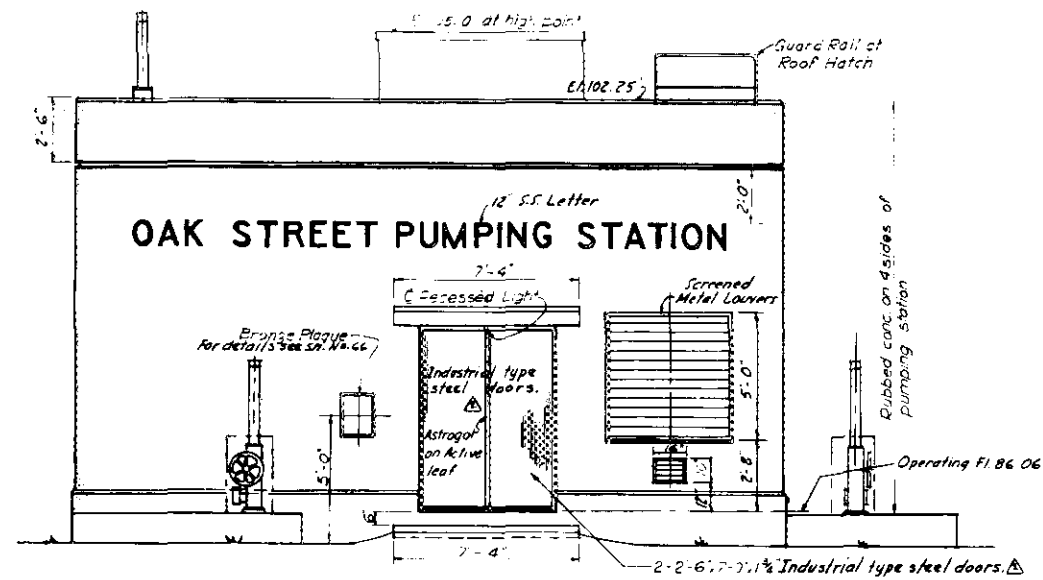




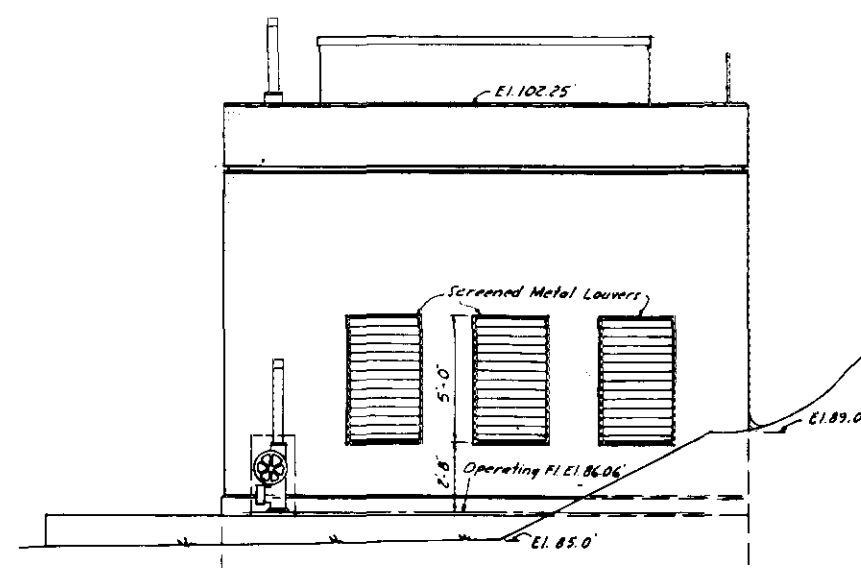
### Record Drawing

Contract No. DA 19-013 ONR ENG 64-19

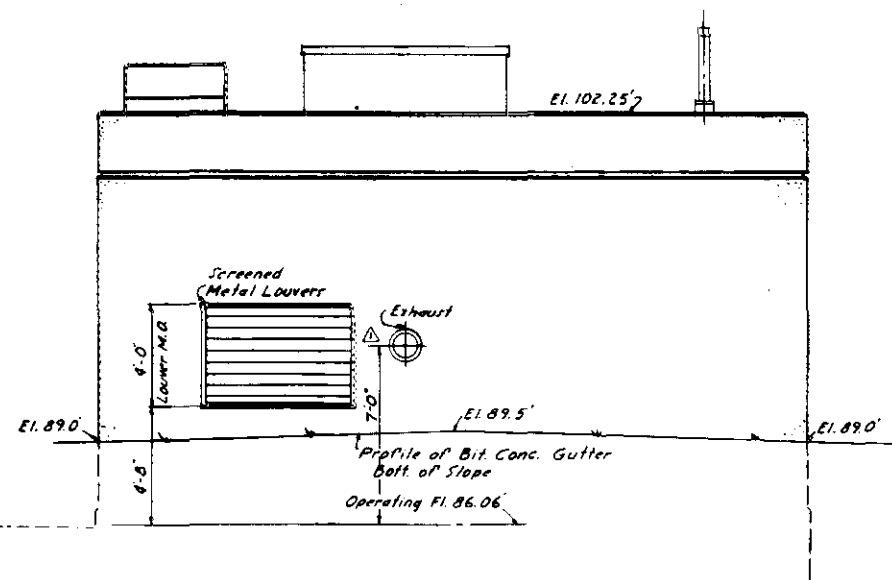
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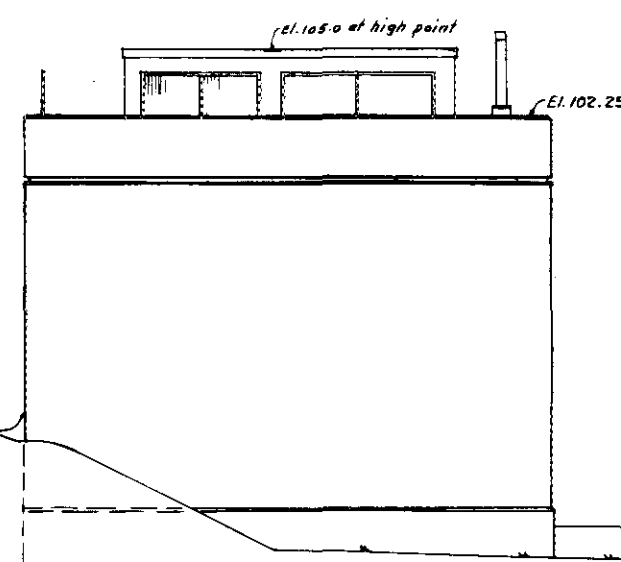
EAST ELEVATION  
SCALE: 3/8" = 1'-0"



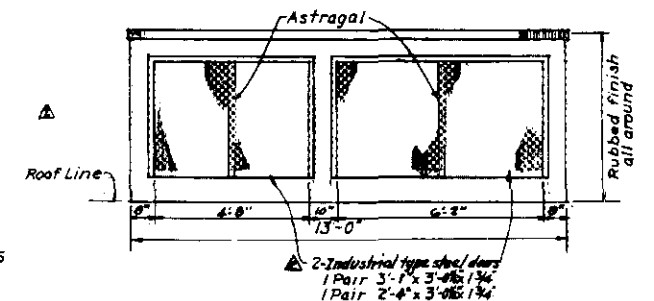
NORTH ELEVATION  
SCALE: 3/8" = 1'-0"



WEST ELEVATION  
SCALE: 3/8" = 1'-0"

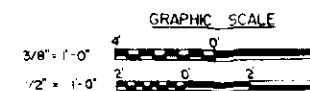


SOUTH ELEVATION  
SCALE: 3/8" = 1'-0"



SOUTH ELEVATION STOP LOG STORAGE  
SCALE: 1/2" = 1'-0"

Record Drawing  
Contract No. DA-19-016 CIV ENG 64-152

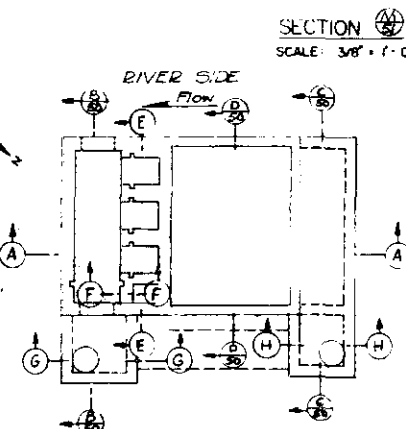
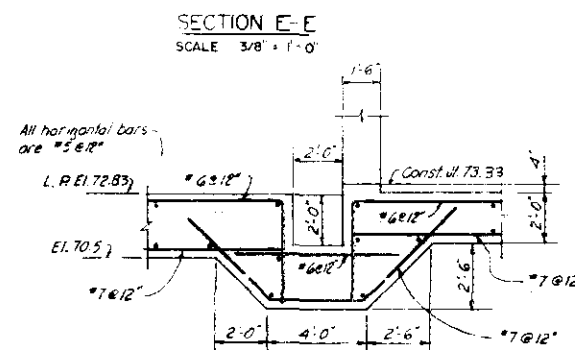
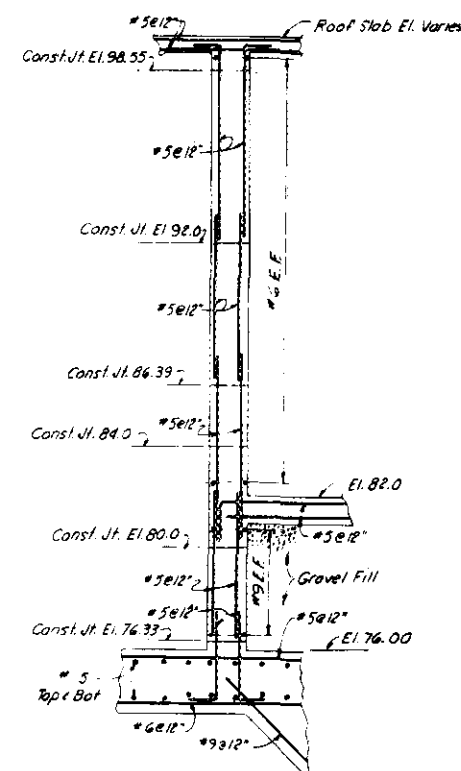
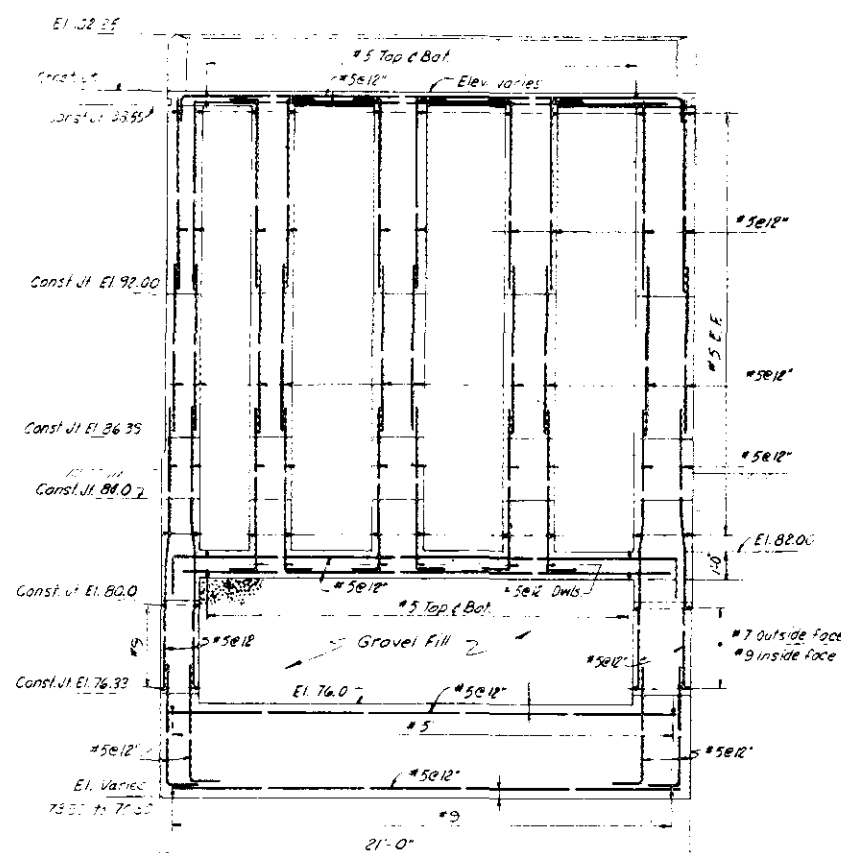
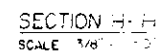
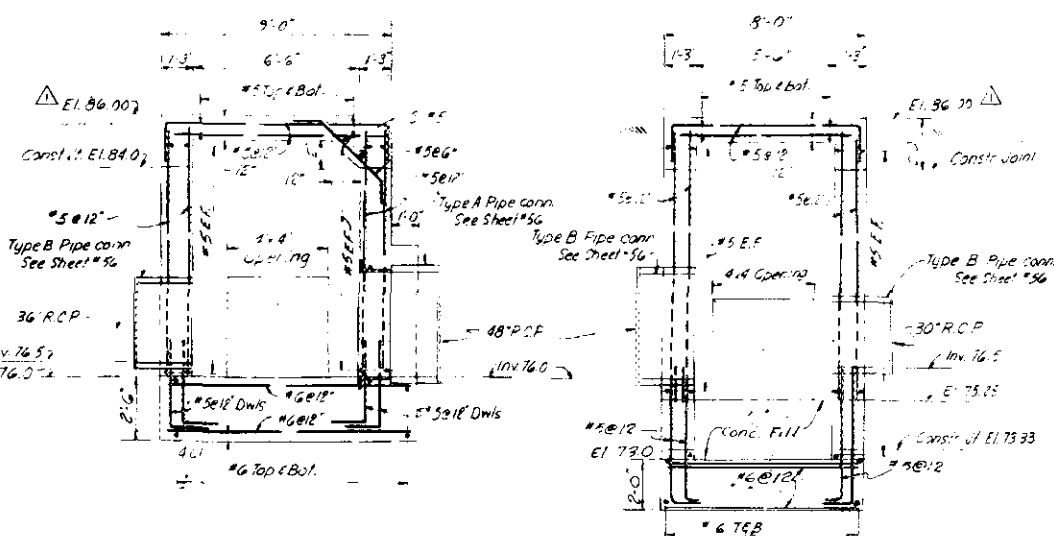


DATE	5-21-63	Spec. No revised.	DATE	5-21-63	Notes revised, note deleted.
DATE	5-16-63	West elevation revised.	DATE	5-16-63	West elevation revised.
DATE	5-16-63	West elevation revised.	DATE	5-16-63	West elevation revised.
DATE	5-16-63	West elevation revised.	DATE	5-16-63	West elevation revised.
DATE	5-16-63	West elevation revised.	DATE	5-16-63	West elevation revised.
DATE	5-16-63	West elevation revised.	DATE	5-16-63	West elevation revised.
DATE	5-16-63	West elevation revised.	DATE	5-16-63	West elevation revised.
DATE	5-16-63	West elevation revised.	DATE	5-16-63	West elevation revised.
DATE	5-16-63	West elevation revised.	DATE	5-16-63	West elevation revised.
DATE	5-16-63	West elevation revised.	DATE	5-16-63	West elevation revised.

GREEN ENGINEERING APPLIANCE, INC.  
BOSTON, MASS.  
ARCHITECT-ENGINEER

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND  
CORPS OF ENGINEERS  
WALTHAM, MASS.

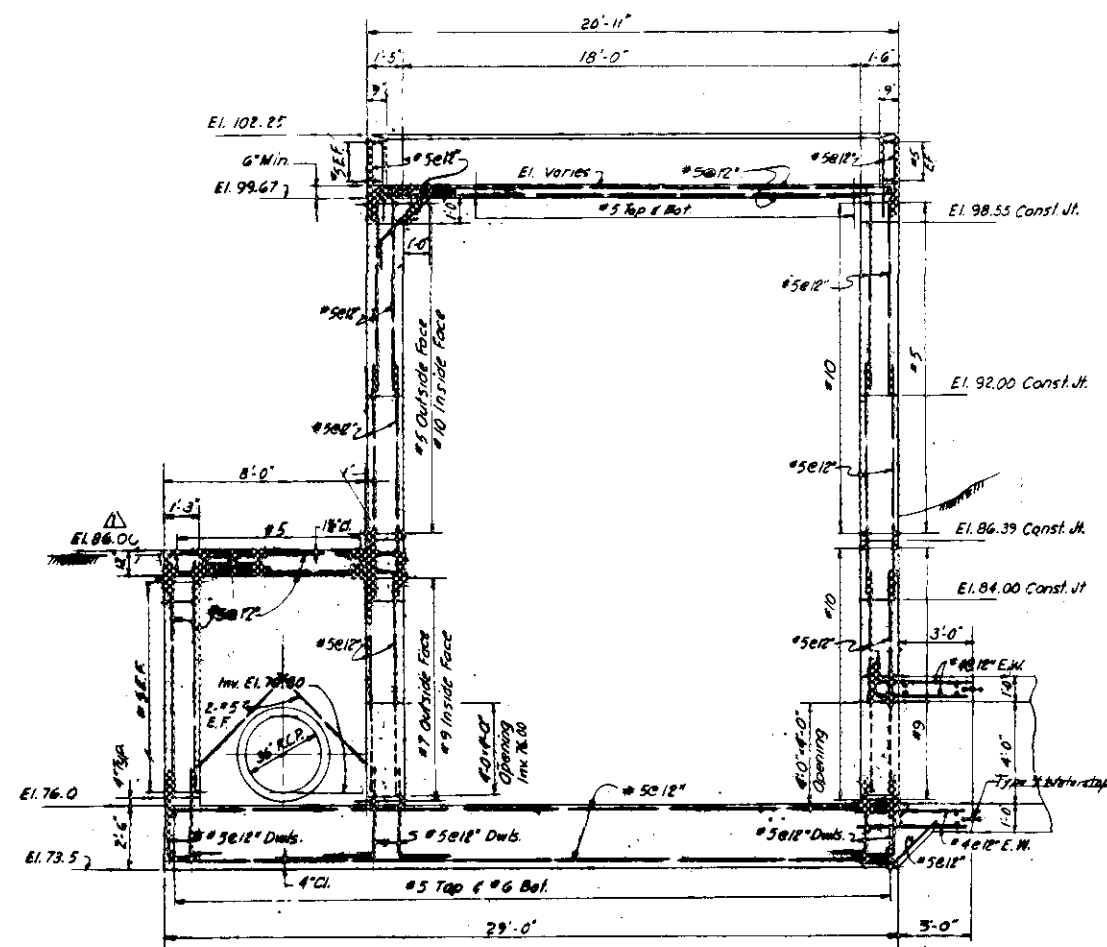
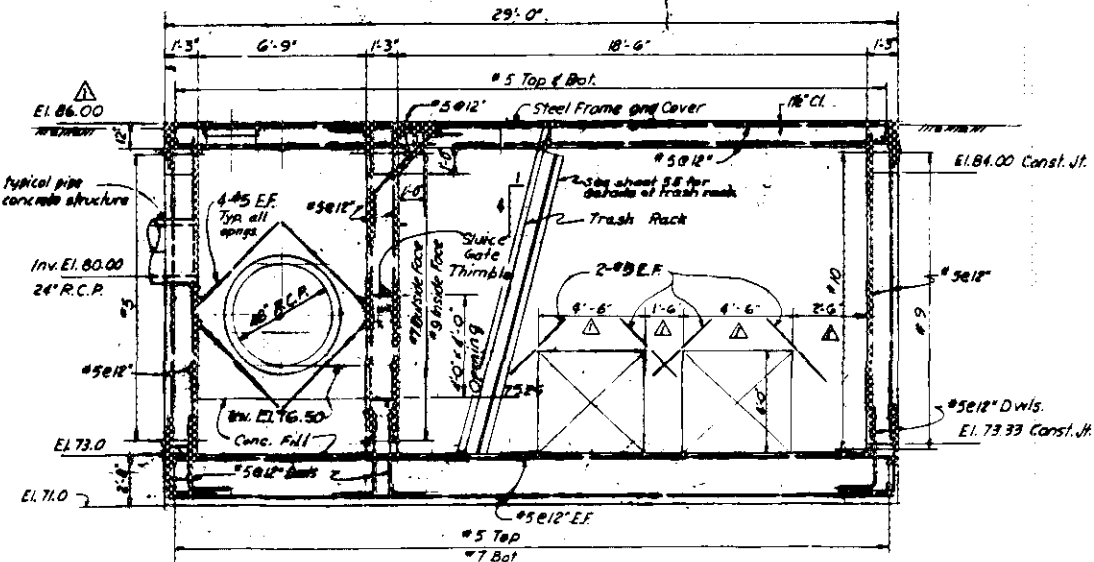
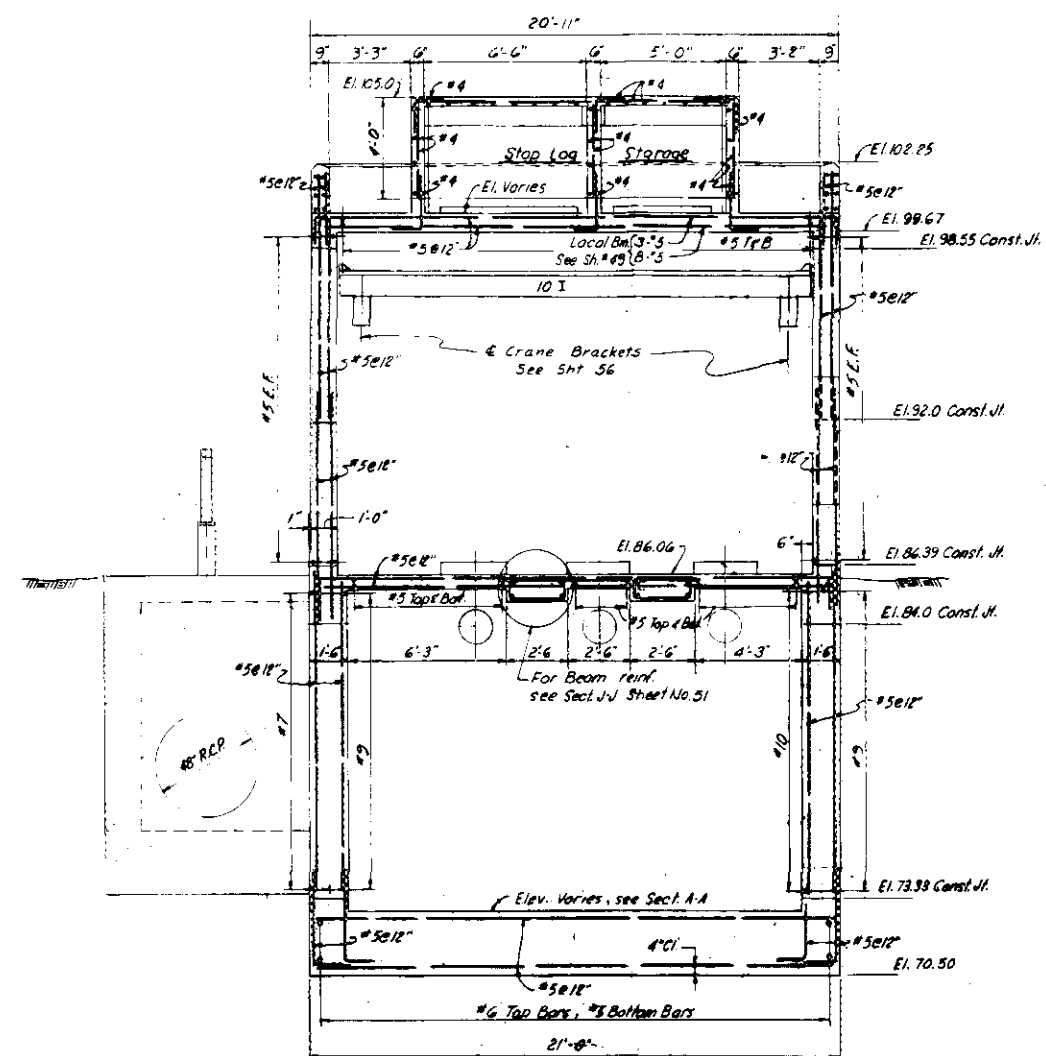
CHICOPEE RIVER FLOOD CONTROL  
CHICOPEE FALLS  
OAK STREET PUMPING STATION  
ARCHITECTURAL  
ELEVATIONS  
CHICOPEE RIVER, MASSACHUSETTS  
DATE APRIL, 1963  
DRAWING NUMBER CT-5885



## Record Drawing

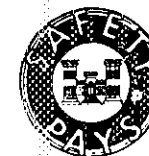
Contract No. DA-19-016-CIV ENG 64-19

[illegible]

SECTION B-B  
SCALE:  $\frac{3}{8}$ " = 1'-0"SECTION C-C  
SCALE:  $\frac{3}{8}$ " = 1'-0"SECTION D-D  
SCALE:  $\frac{3}{8}$ " = 1'-0"

Record Drawing

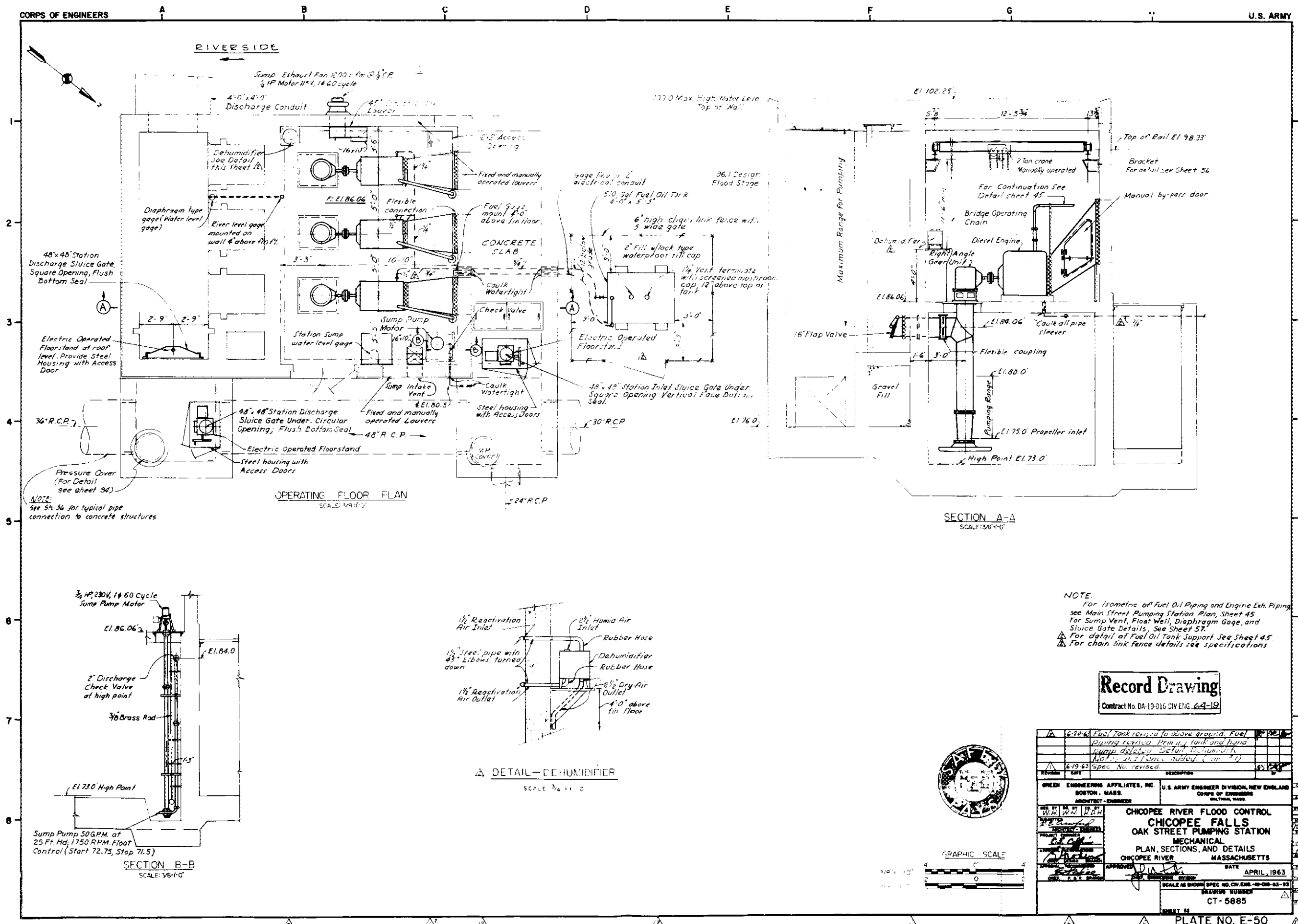
Contract No. DA-19-016-CIV ENG 64-19

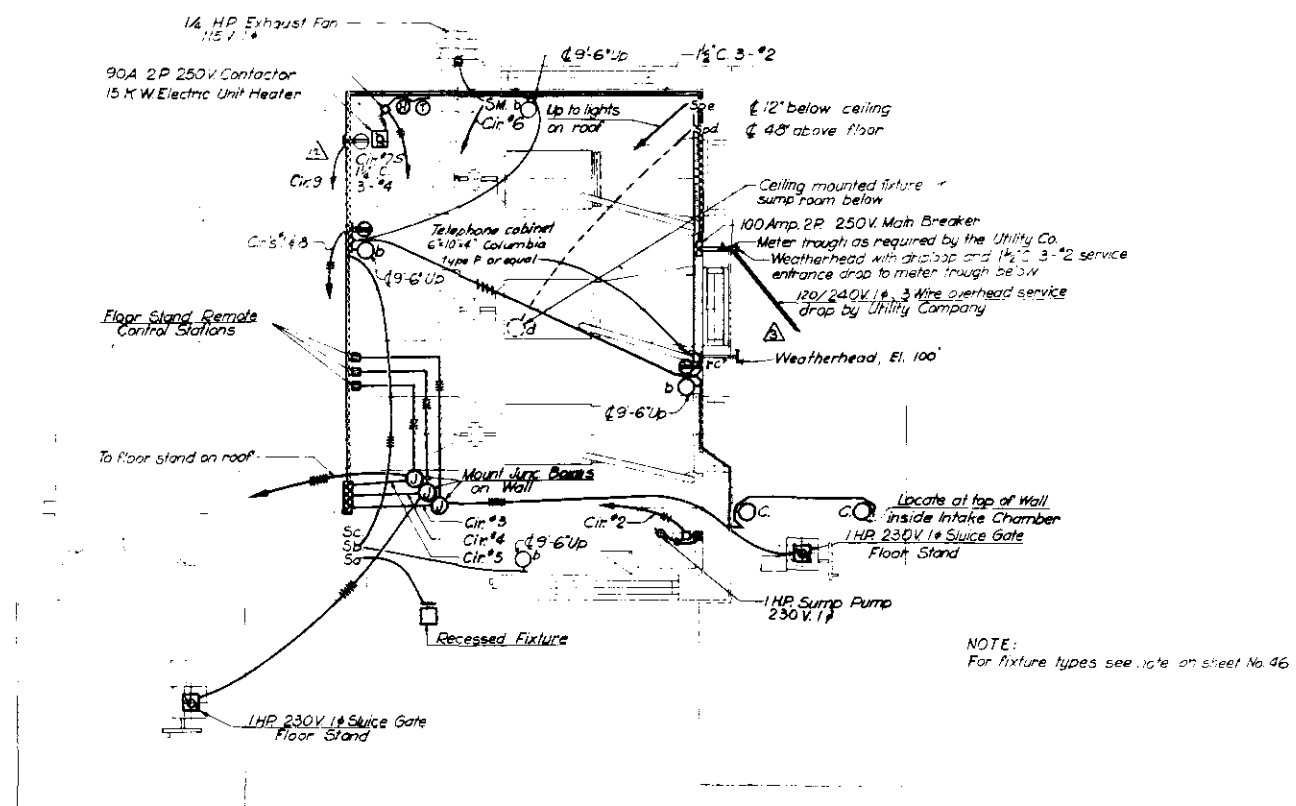
GRAPHIC SCALE  
0' 1' 2' 3' 4' 5' 6' 7' 8' 9' 10'

ENGINEERING AFFILIATES, INC. BOSTON, MASS. ARCHITECT-ENGINEER		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND GROUP OF ENGINEERS WALTHAM, MASS.	
CHICOPEE RIVER FLOOD CONTROL CHICOPEE FALLS OAK STREET PUMPING STATION STRUCTURAL REINFORCING DETAILS NO. 2 CHICOPEE RIVER, MASSACHUSETTS			
DATE: APRIL, 1952		SCALE AS SHOWN SPEC. CH. 27, DIV. 10-20-20-21	
SHEET NO.		CT-5885	

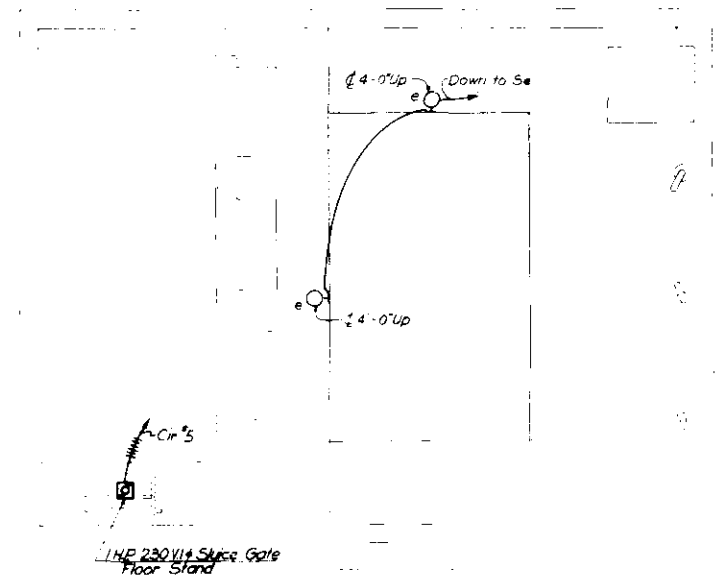
PLATE NO. E-48







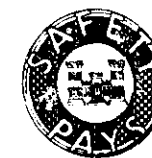
FLOOR PLAN  
SCALE 3/8"=1'-0"



ROOF PLAN  
SCALE 3/8"=1'-0"

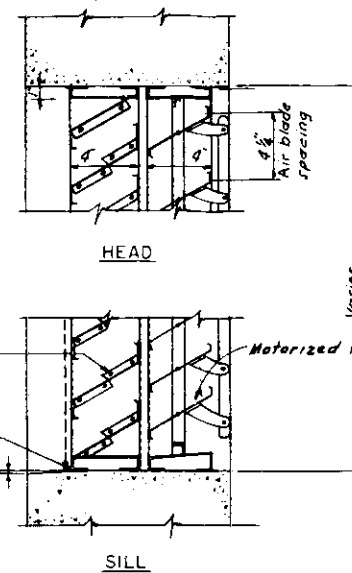
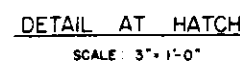
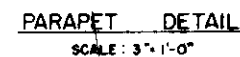
PANEL BOARD SCHEDULE					
100 AMP 120/240 VOLT 1Φ, 3 WIRE MAIN LUGS					
CIR. NO.	BRANCH BREAKER SIZE	COND. NO.	WIRE	SERVICES	CONNECTED LOAD WATTS
1	20	1	3/4" 2 - #12	LIGHTING AND RECEPTACLES	1200
2	20	2	3/4" 3 - #12	SUMP PUMP	1400
3	20	2	3/4" 2 - #12	FLOOR STAND	1400
4	20	2	3/4" 2 - #12	FLOOR STAND	1400
5	20	2	3/4" 2 - #12	FLOOR STAND	1400
6	20	1	3/4" 2 - #12	EXHAUST FAN	300
7	90	2	3/4" 3 - #4	UNIT HEATER	5000
8	30	1	3/4" 2 - #12	RECEPTACLES	500
9	20	2	3/4" 2 - #12	DEHUMIDIFIER	1200
10	20	1	---	SPACE	---
11	20	1	---	SPACE	---
TOTAL					22600

Record Drawing  
Contract No. DA-19-016 CIV ENG 64-18

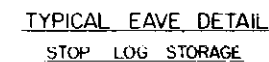
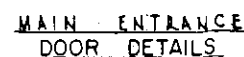


3/8" 0' 4' SCALE

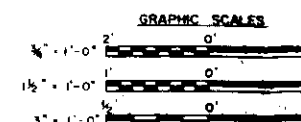
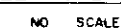
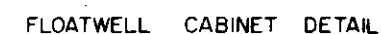
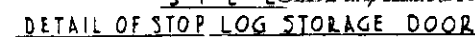
GREEN ENGINEERING APPLIATES, INC. BOSTON, MASS. ARCHITECT-ENGINEER		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	
CHICOPEE RIVER FLOOD CONTROL CHICOPEE FALLS OAK STREET PUMPING STATION ELECTRICAL PLANS AND SECTION CHICOPEE RIVER MASSACHUSETTS			
DATE: APRIL 1963		DATE: APRIL 1963	
DRAWING NUMBER: CT-5885		DRAWING NUMBER: CT-5885	



LOUVER DETAILS



SCALE 1 1/2" = 1'-0"



NO. SCALE  
Symmetrical  
of Exhaust



SCALE:  $1\frac{1}{2}" = 1'-0"$

## Record Drawing

Contract No. DA-19-016 CIV ENG 64-19

7-19-63	Detail revised	(Ad. #8)	10
7-19-63	Spec. No. revised		10
5-21-63	Detail and notes revised		10
5-21-63	Dimensions deleted, note added		10
DATE	REVISION		#

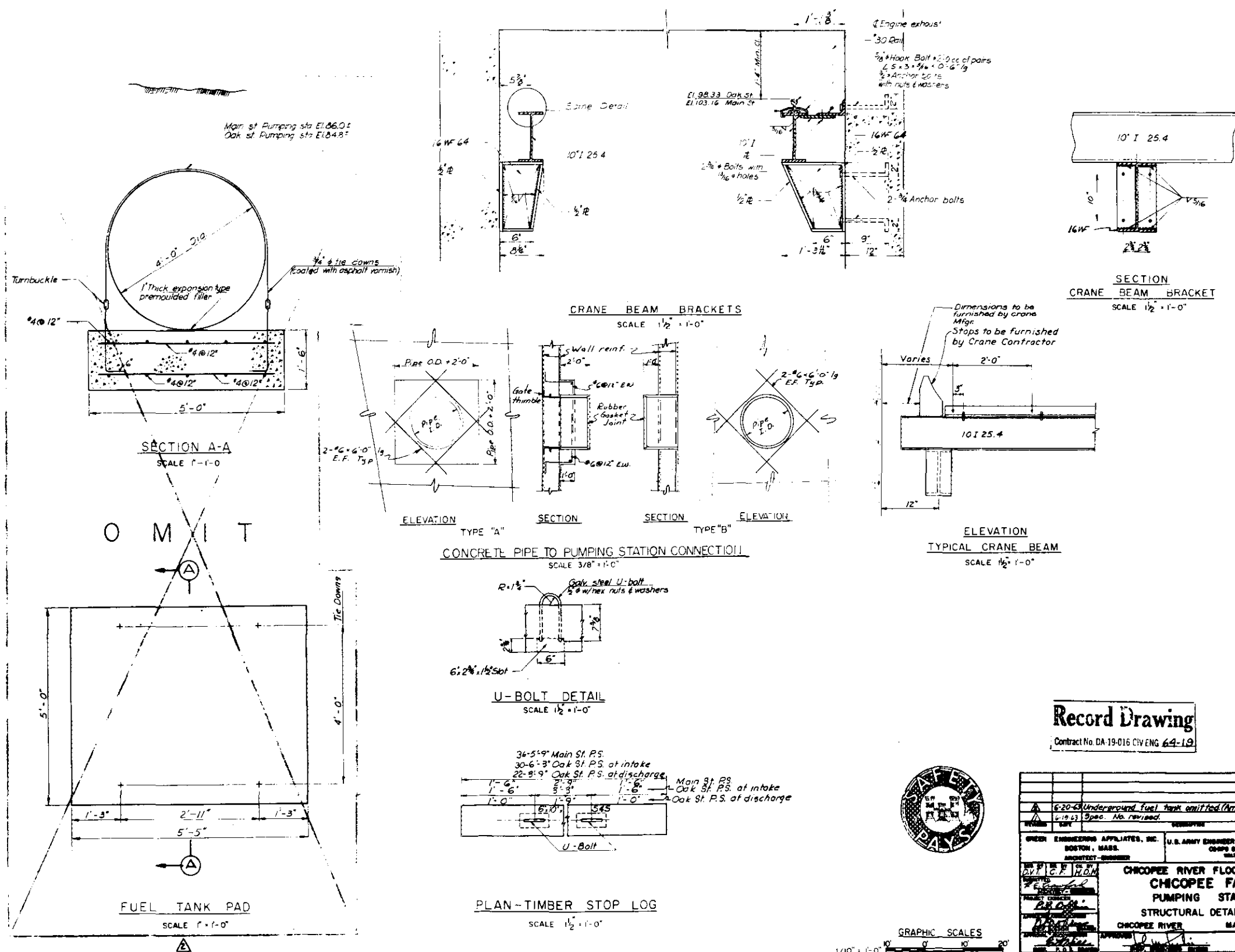
GREEN ENGINEERING APPLIATES, INC. BOSTON - MASS. ARCHITECT - ENGINEER	U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS WILTON, MAINE
---	---

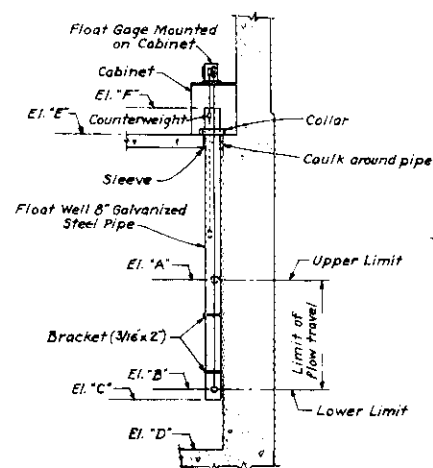
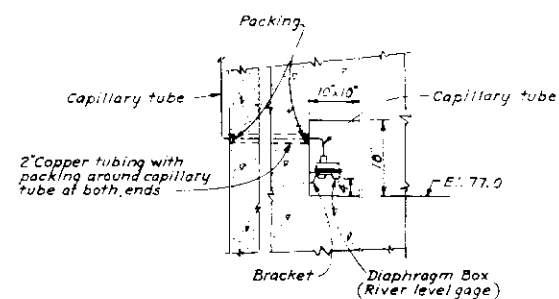
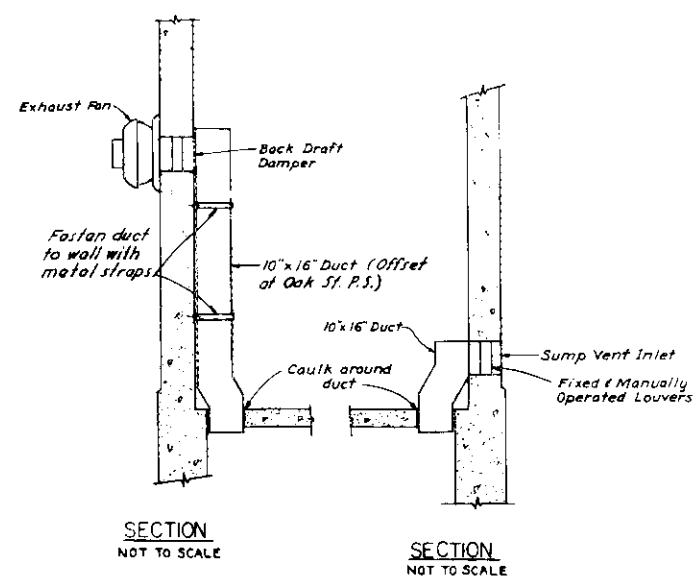
  

PROJECT NO. <u>100-100-100</u> DRAWING NO. <u>5885</u> SHEET NO. <u>1</u> DATE <u>APRIL, 1963</u> BY <u>J. A. M.</u>	CHICOOPEE RIVER FLOOD CONTROL CHICOOPEE FALLS PUMPING STATIONS ARCHITECTURAL DETAILS CHICOOPEE RIVER MASSACHUSETTS DATE <u>APRIL, 1963</u> SCALE <u>AS SHOWN</u> DRAWING NUMBER CT - 5885
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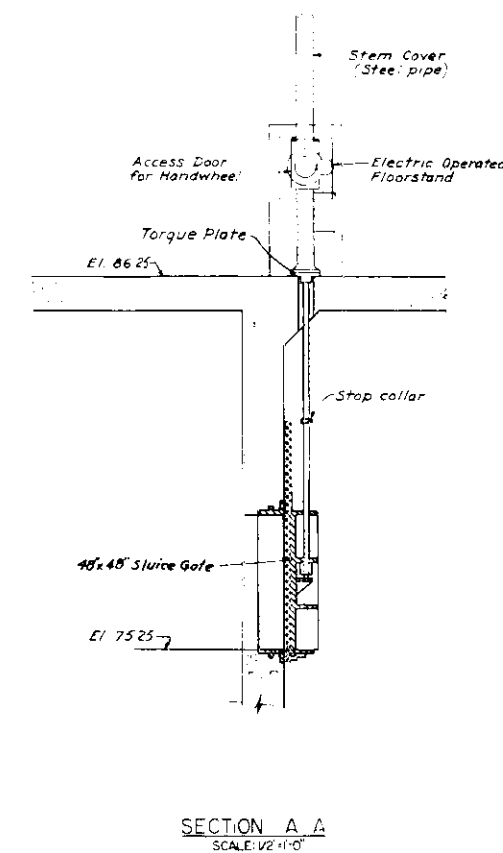
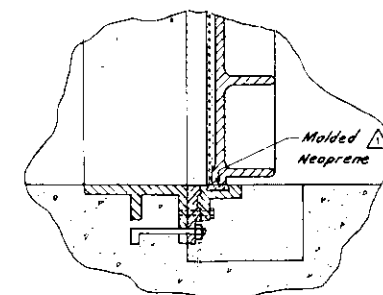




ELEV. FOR SUMP FLOAT WELL						
	A	B	C	D	E	F
OAK ST. PUMPING STA.	81.0	74.0	73.5	73.0	86.08	87.56
MAIN ST. PUMPING STA.	84.0	75.0	74.5	74.0	80.0	91.5

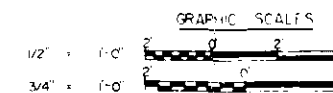
ELEVATION-OAK STREET STATION INLET SLUICE GATE

SCALE: 1/2" = 1'-0"

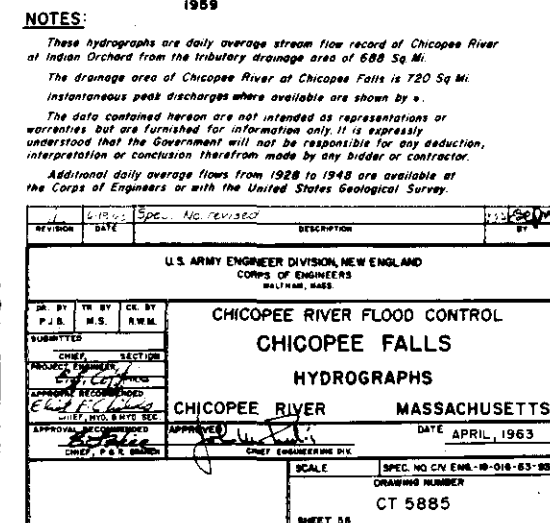


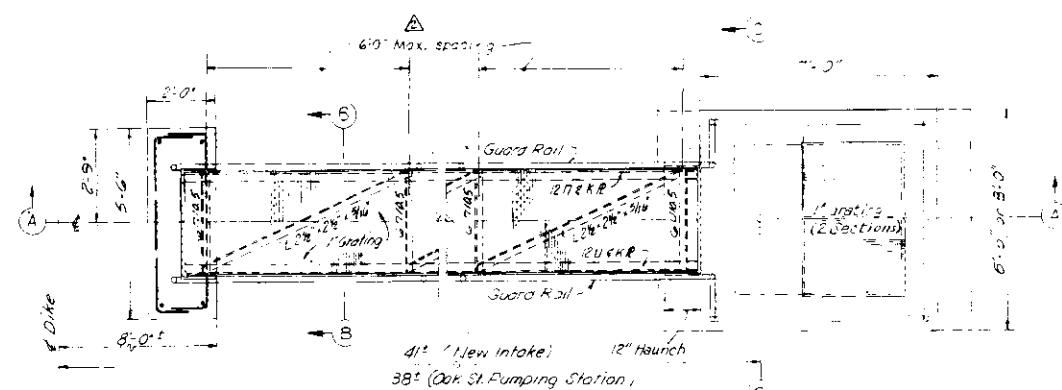
**Record Drawing**

Contract No. DA-19-016 CIV. ENG. 64-19

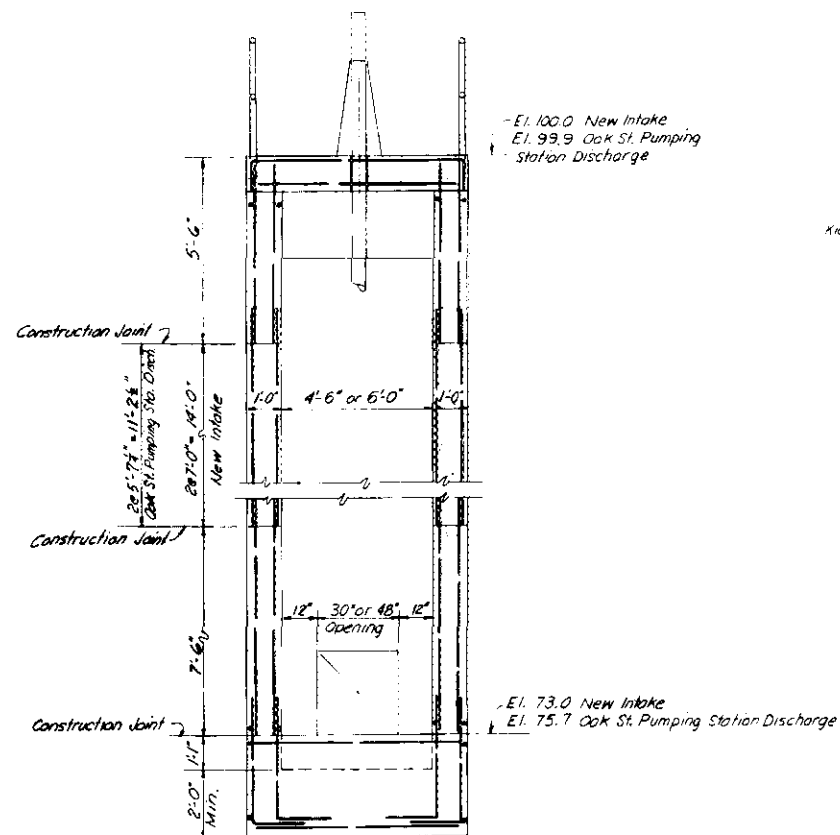


GREEN ENGINEERING APPLIQUES, INC. BOSTON, MASS.		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	
DESIGNED BY: [Signature]		CHECKED BY: [Signature]	
DRAWN BY: [Signature]		APPROVED BY: [Signature]	
DATE: [Date]		DATE: [Date]	
PROJECT: CHICOPEE RIVER FLOOD CONTROL		PROJECT: CHICOPEE RIVER FLOOD CONTROL	
STATION: CHICOPEE FALLS		STATION: CHICOPEE FALLS	
DRAWING: MECHANICAL DETAILS		DRAWING: MECHANICAL DETAILS	
SHEET: 5885		SHEET: 5885	



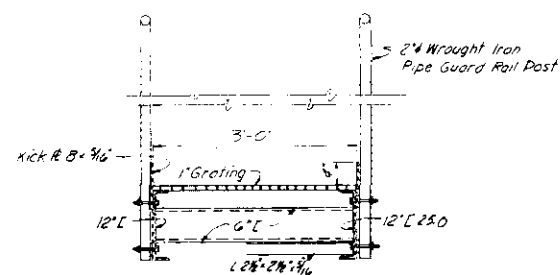


PLAN  
SCALE: 1/2" = 1'-0"

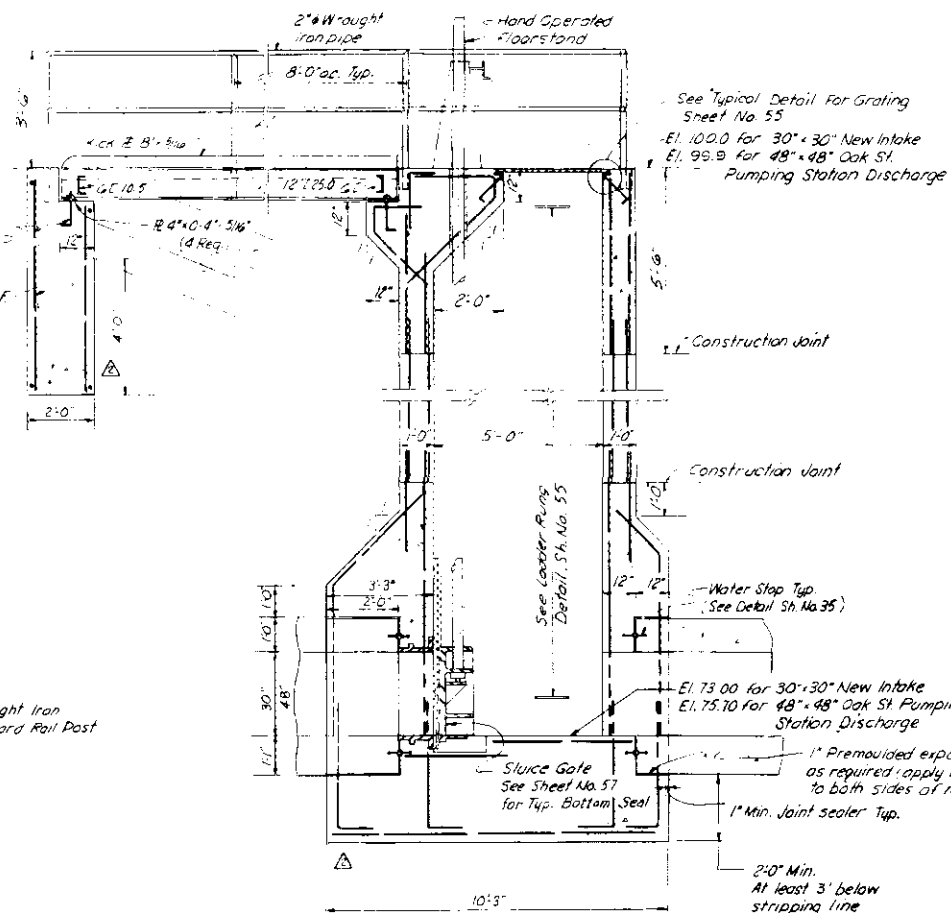


NOTE:  
Reinf. shown #6 @ 12" E.F.E.W.

SECTION C-C  
SCALE: 1/2" = 1'-0"



SECTION B-B  
SCALE: 1" = 1'-0"



SECTION A-A  
SCALE: 1/2" = 1'-0"

- NOTES:
- Two gate structures are to be constructed.
  - See Sheet Nos. 13, 35 and 36 for Plan and Profiles.

Record Drawing

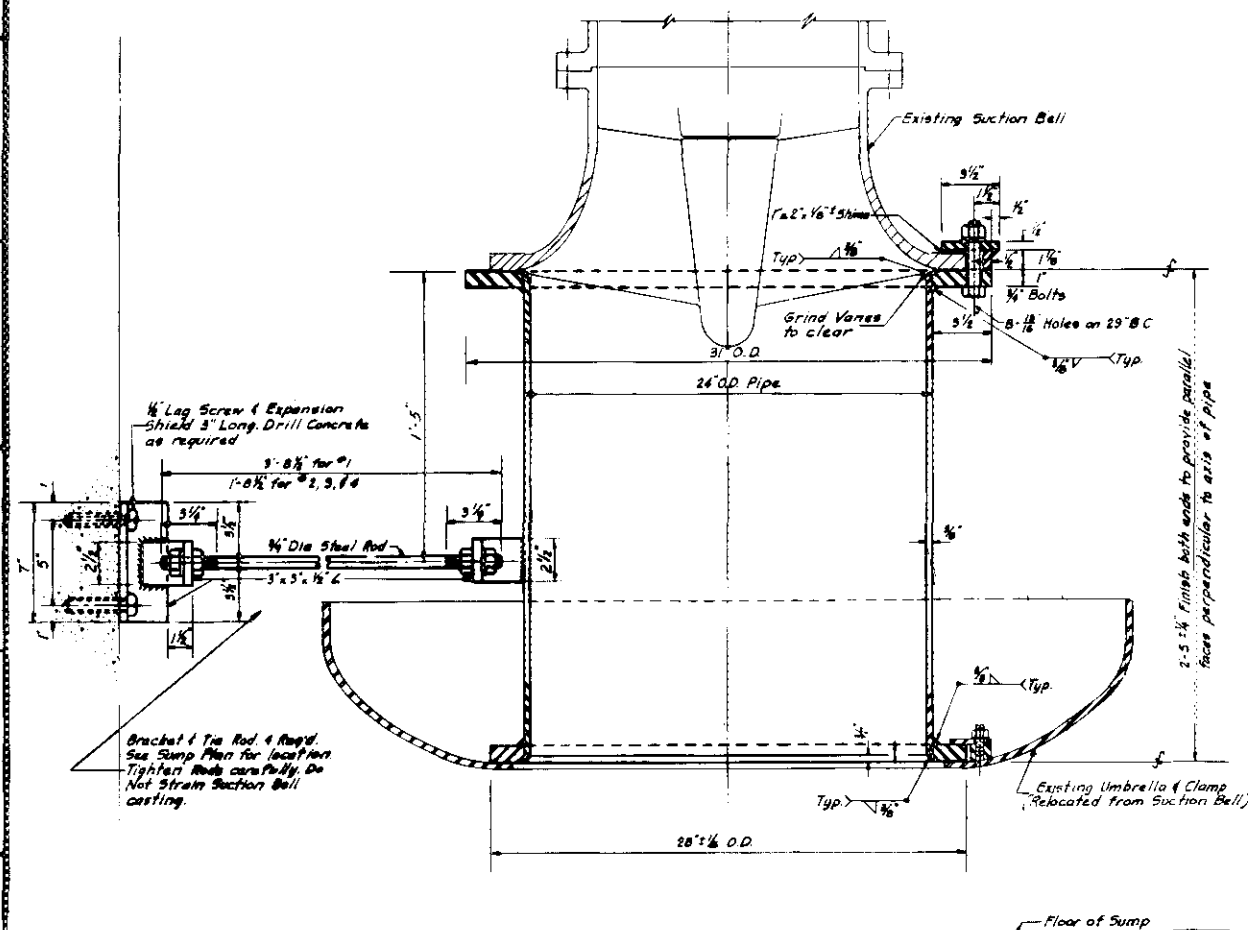
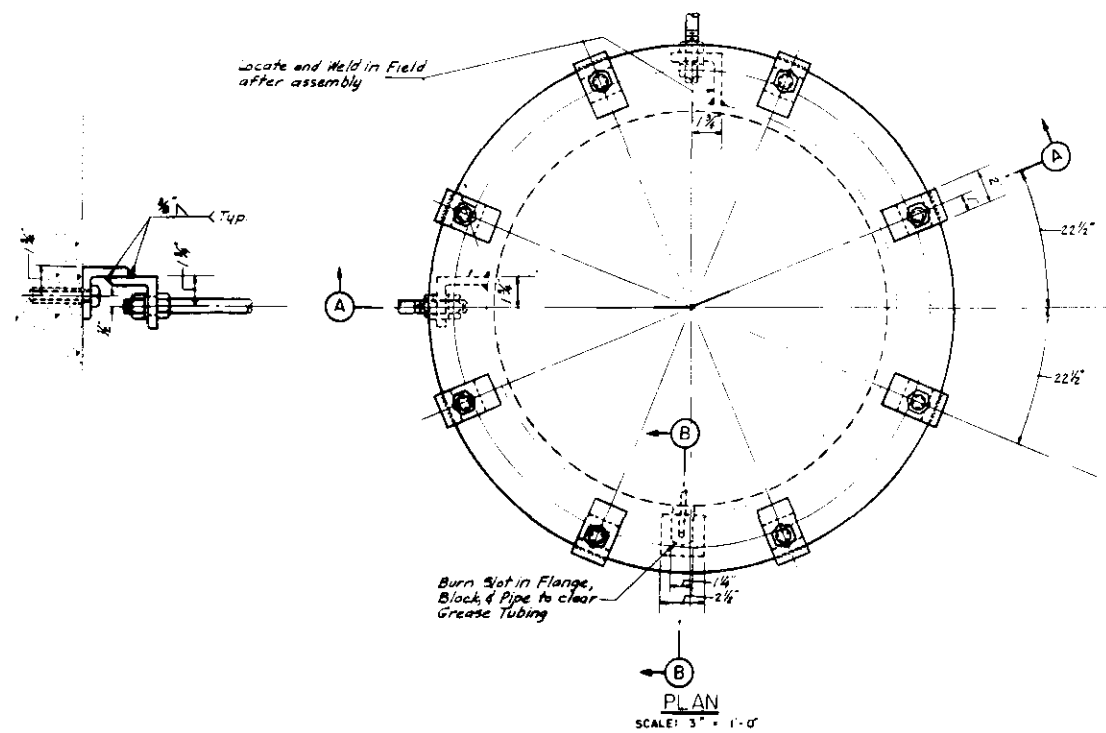
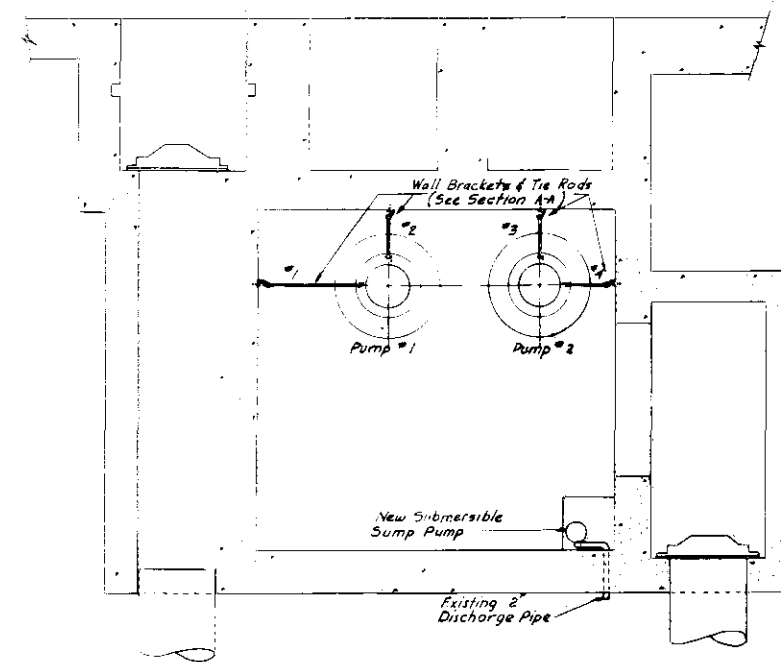
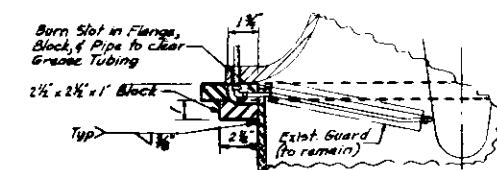
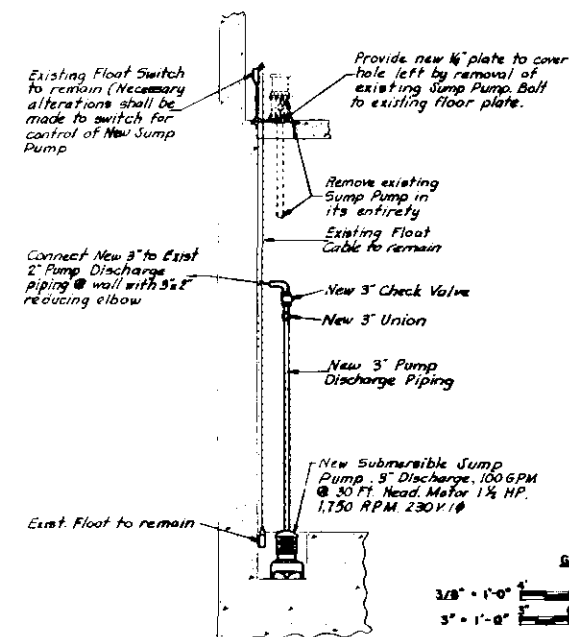
Contract No. DA-19-016-CIV.ENG. 64-19

CHICOPEE RIVER FLOOD CONTROL CHICOPEE FALLS RIVER GATE STRUCTURES DETAILS CHICOPEE RIVER MASSACHUSETTS		U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS BOSTON, MASS.	
DESIGNED BY: [Signature] CHECKED BY: [Signature] APPROVED BY: [Signature]		DATE: MAY 1963	
SCALE: AS SHOWN SPEC. NO. CIV. ENG. 64-19		DRAWING NUMBER: CT-5885	

GRAPHIC SCALES

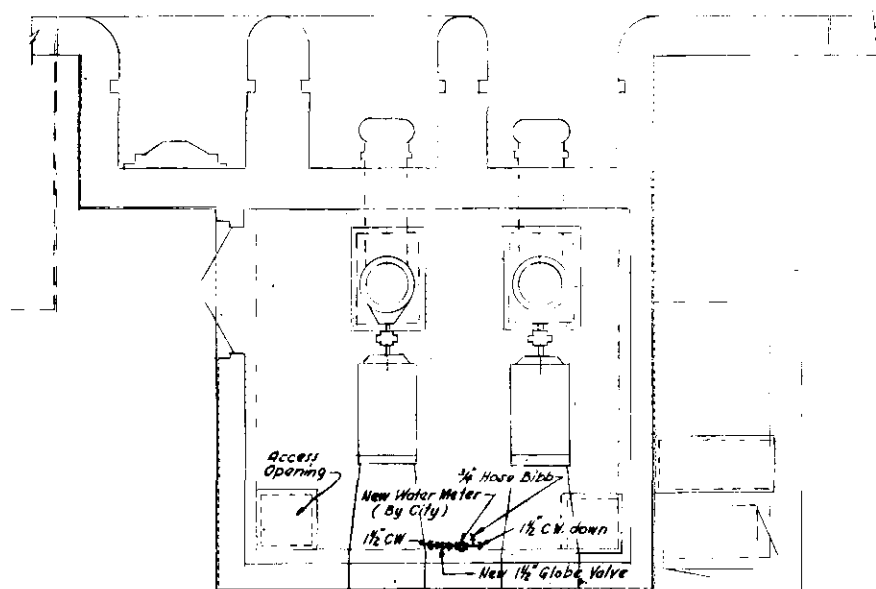
1/2" = 1'-0"

1" = 1'-0"

SECTION A-A  
SCALE: 3" = 1'-0"SUMP PLAN  
SCALE: 3/8" = 1'-0"SECTION B-B  
SCALE: 3" = 1'-0"DETAIL- SUMP PUMP  
SCALE: 3/8" = 1'-0"

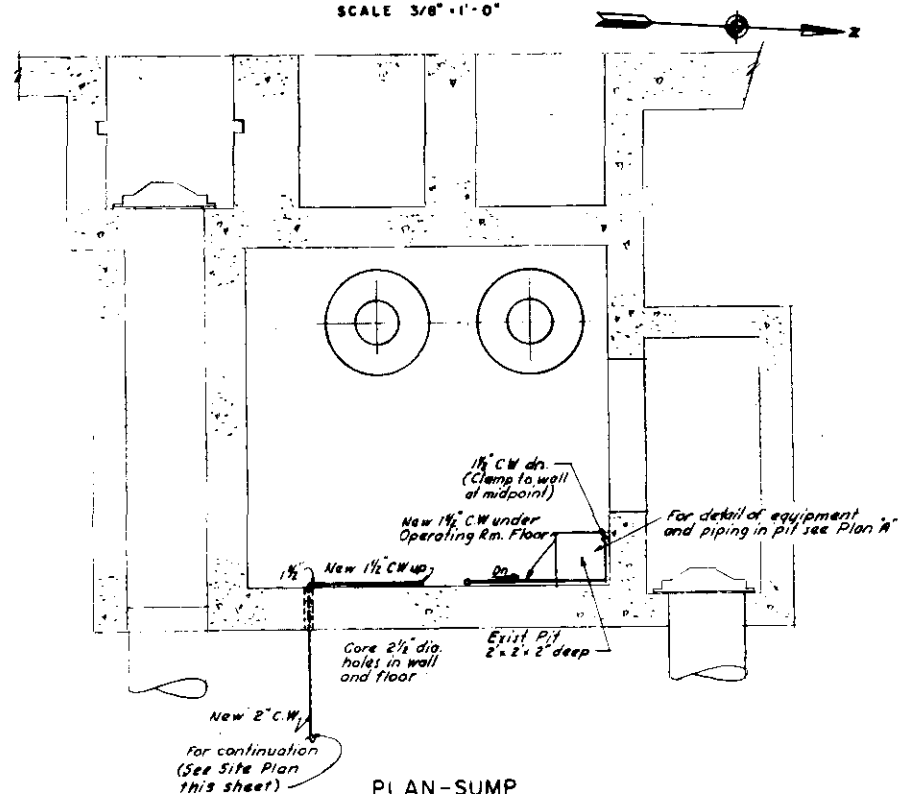
**Record Drawing**  
Contract No. PURCHASE ORDER

U.S. ARMY ENGINEERING CENTER, NEW BRUNSWICK CORPS OF ENGINEERS SECTION 0000	
CONNECTICUT RIVER FLOOD CONTROL CHICOPEE FALLS MAIN STREET PUMPING STATION MODIFICATIONS TO PUMPS NO. 1 & NO. 2 AND REPLACEMENT OF SUMP PUMP	
CHICOPEE RIVER	MASS.
DATE: 1/10/66	BY: [Signature]
SCALE AS SHOWN	PURCHASE ORDER
CON-42	SHEET 1



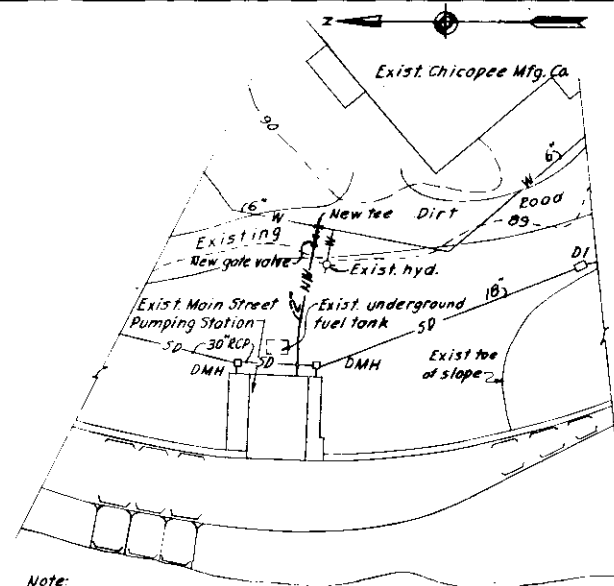
PLAN OPERATING FLOOR  
MAIN STREET PUMPING STATION

SCALE 3/8" = 1'-0"



PLAN-SUMP  
MAIN STREET PUMPING STATION

SCALE 3/8" = 1'-0"

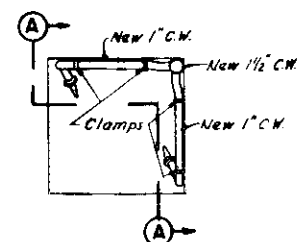


Note:  
Areas disturbed by construction  
shall be restored to match existing.

SITE PLAN

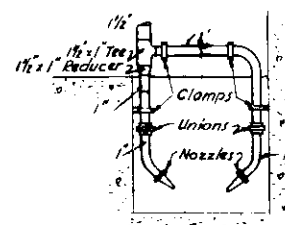
MAIN STREET PUMPING STATION

SCALE 1" = 20'



PLAN "A"

SCALE 1" = 1'-0"



SECTION A-A

SCALE 1" = 1'-0"

# NOTES:

1. Connection to the main may be made wet or dry but ARRANGEMENTS FOR THE TIME, TYPE AND METHOD OF CONNECTION MUST BE MADE IN ADVANCE AND APPROVED BY THE PLANT ENGINEER, CHICOPEE MANUFACTURING COMPANY. The existing main is a fire main and cannot be disturbed without authorization.
2. Outside water line shall have 4 feet of cover.
3. 2-inch gate valve shall be brass. Install cast iron valve box with word "WATER" on cover.
4. All exterior piping shall be type "K" soft temper copper tubing with flared fittings.
5. All interior new cold water piping shall be type "K" soft temper copper tubing. Changes in direction from tee to nozzles shall be made by machine bending tubing (4" radius). Wall clamps shall be copper with brass bolts.
6. Hose nozzle - size 1", discharge 3/4", length 4", heavy duty cast brass.

Record Drawing

Contract No. PURCHASE ORDER

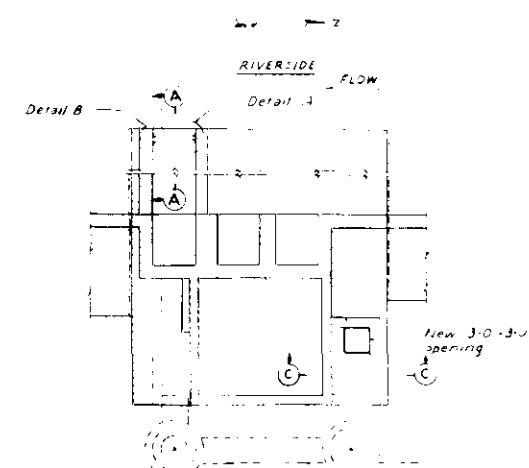
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS CHICPEE, MASS.	
CONNECTICUT RIVER FLOOD CONTROL CHICOPEE FALLS MAIN STREET PUMPING STATION WATER SUPPLY PLANS AND DETAILS CHICOPEE RIVER MASS.	
APPROVED E. F. Coffey CHIEF ENGINEER	DATE JUNE 1938
PURCHASE ORDER CON - 56 SHEET 1	

## GRAPHIC SCALES

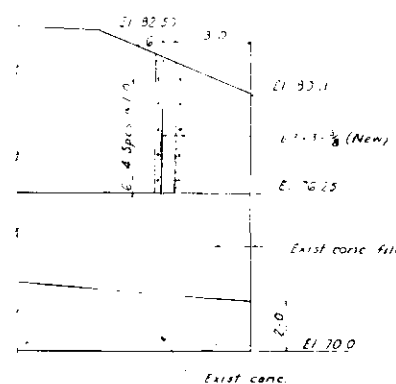
3/8" = 1'-0"

1" = 1'-0"

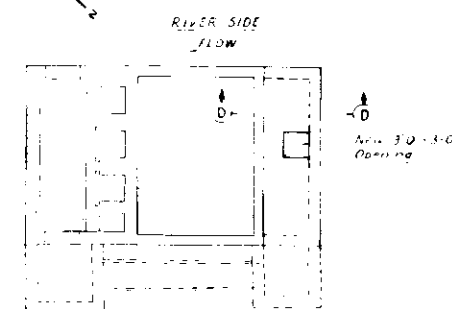
1" = 20'-0"



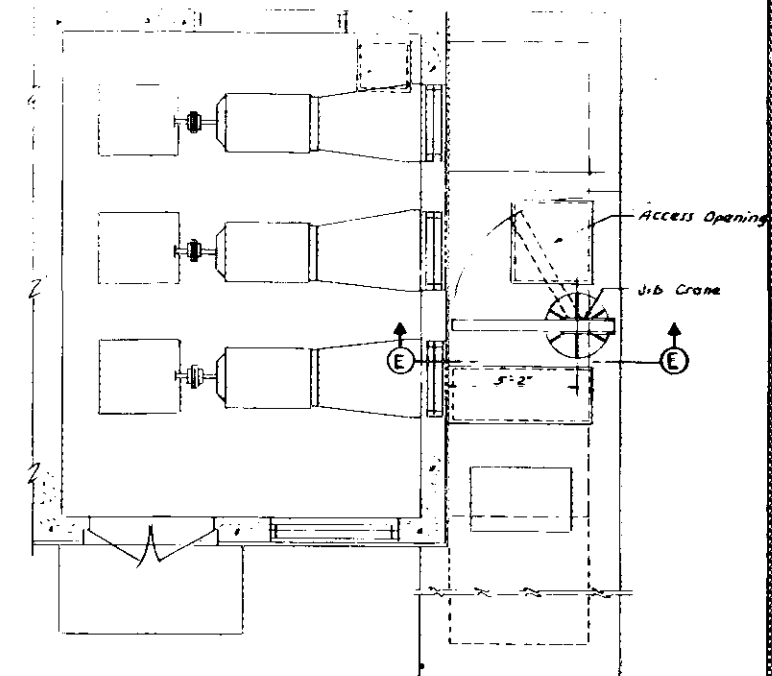
**KEY PLAN**  
MAIN STREET PUMPING STATION  
Scale 1/8"=1'-0"



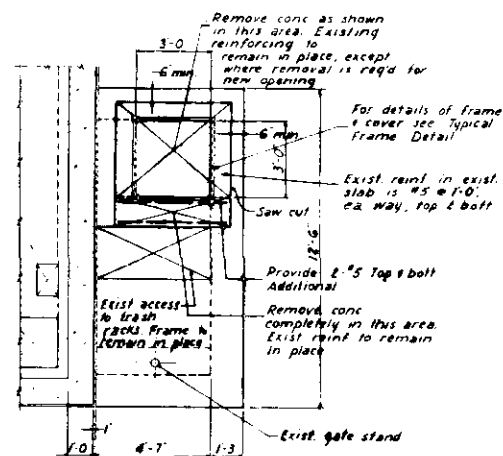
**SECTION A-A**  
Scale 1/8"=1'-0"



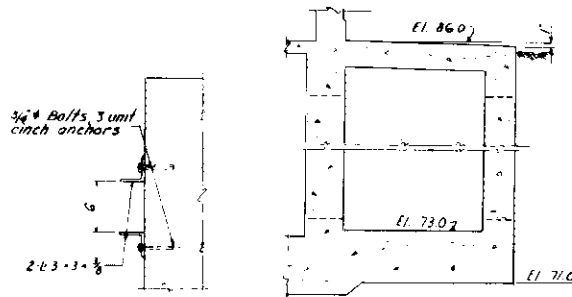
**KEY PLAN**  
OAK STREET PUMPING STA.  
Scale 1/8"=1'-0"



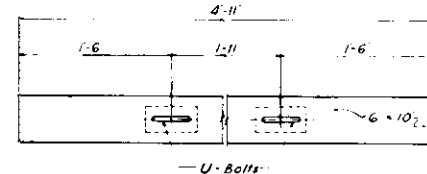
**FLOOR PLAN**  
OAK STREET PUMPING STATION  
SCALE: 3/8"=1'-0"



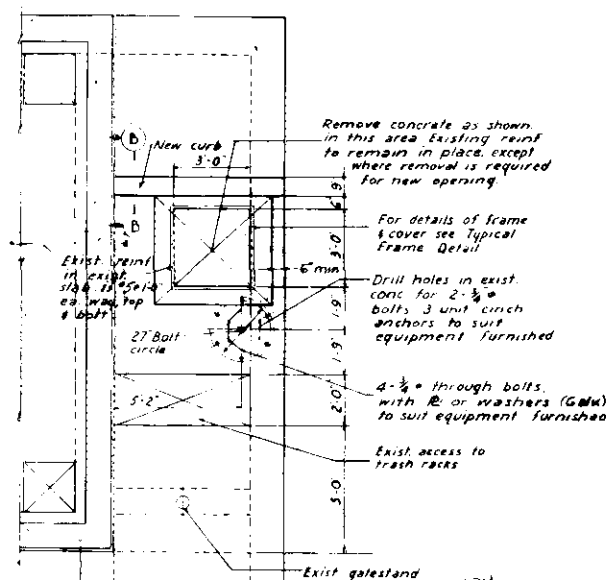
**PART PLAN - EL. 90.0**  
Scale 1/8"=1'-0"



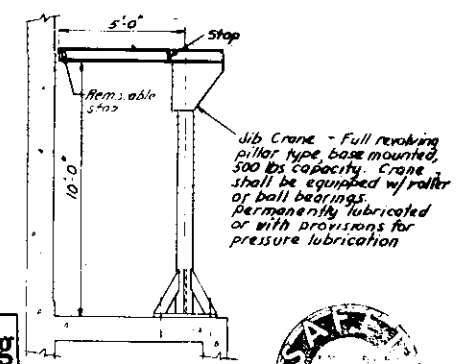
**SECTION D-D**  
Scale 1/8"=1'-0"



**PLAN - TIMBER STOP LOG**  
7-REQD  
Scale 1/8"=1'-0"

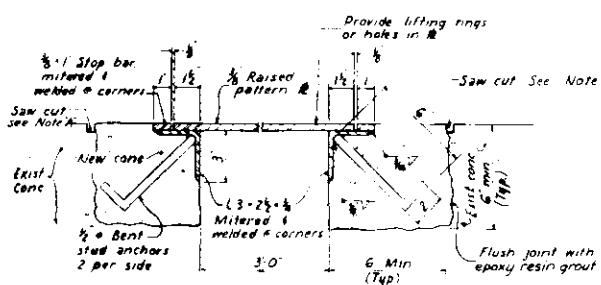


**PART PLAN - EL. 86.0**  
Scale 1/8"=1'-0"



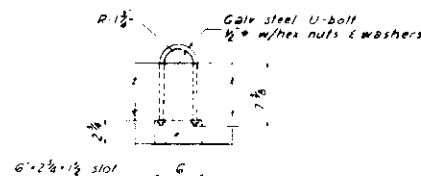
**SECTION E-E**  
SCALE: 3/8"=1'-0"

**Record Drawing**  
Contract No. PURCHASE ORDER

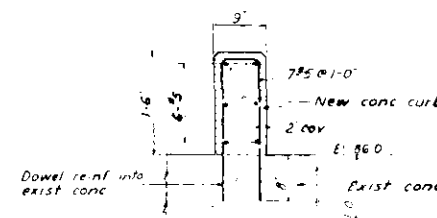


**TYPICAL FRAME DETAIL - OPENING**  
Scale 3/8"=1'-0"

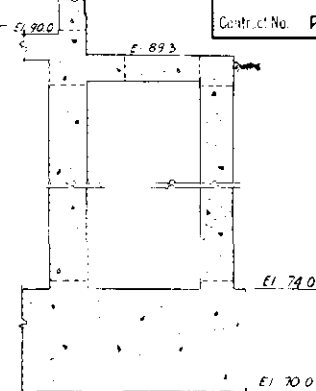
**NOTE A**  
Saw cut shall extend to top of reinforcing. Reinforcing is approximately 1/2" below top of concrete



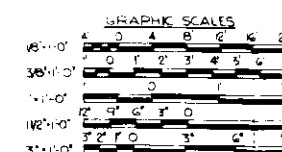
**U-BOLT DETAIL**  
Scale 1/8"=1'-0"



**SECTION B-B**  
SCALE 1/8"=1'-0"



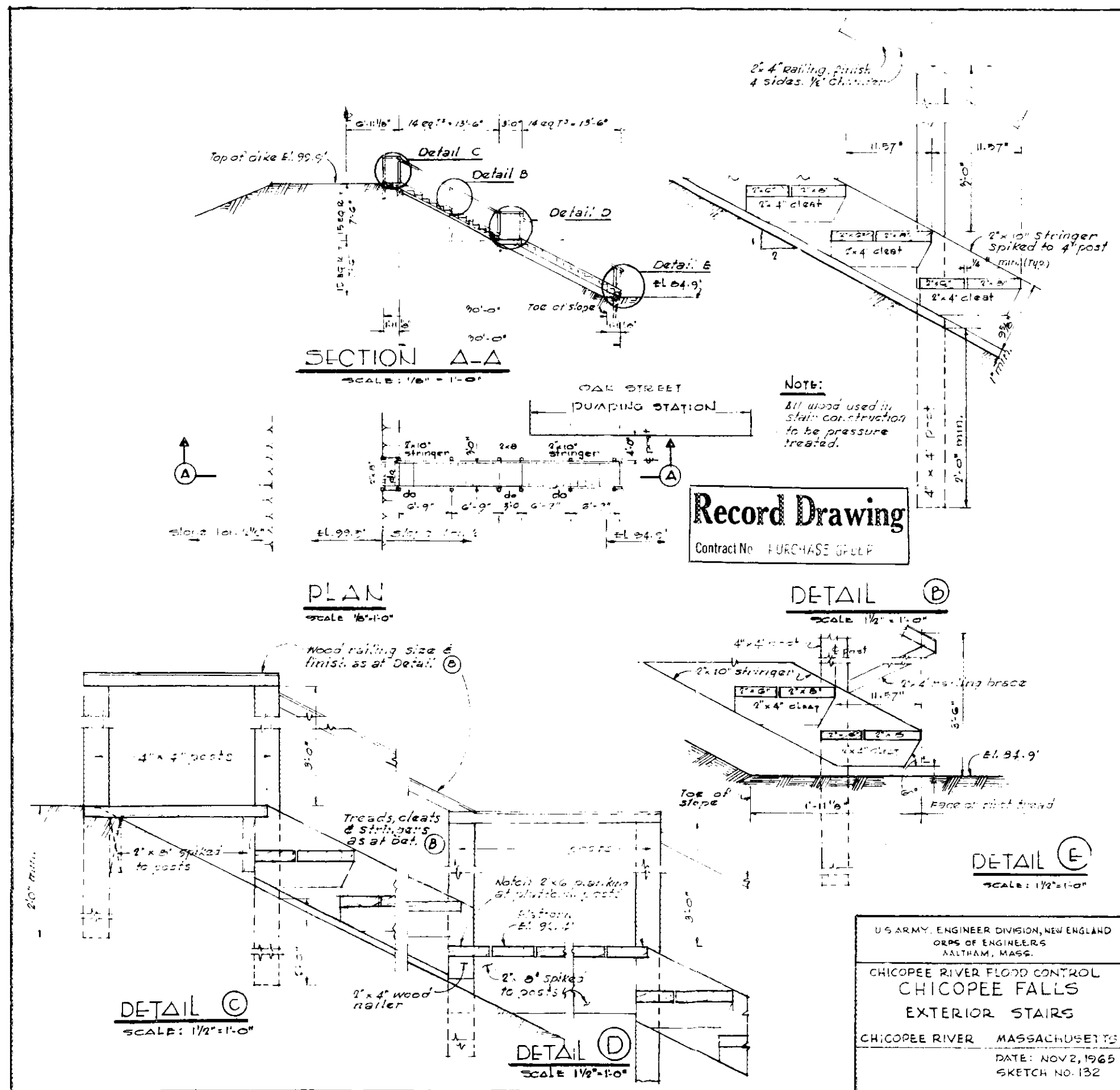
**SECTION C-C**  
SCALE 3/8"=1'-0"



**NOTES:**  
Contractor to verify all dimensions in the field. Saw cut concrete prior to demolition, and use only light pneumatic hammers.

1-13-66 Title block and drawing no. revised.	
REVISION	DESCRIPTION
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND CORPS OF ENGINEERS BALTIMORE, MD.	
DESIGNED BY EPA J.A.D. CHECKED BY E.P. Collins APPROVED BY J.M. Collins	<b>CONNECTICUT RIVER FLOOD CONTROL</b> <b>CHICOPEE FALLS</b> <b>MAIN AND OAK STREETS PUMPING STATIONS</b> <b>STRUCTURAL MODIFICATIONS</b> <b>PLANS, SECTIONS AND DETAILS</b> CHICOPEE RIVER DATE DEC 1965 SCALE AS SHOWN PURCHASE ORDER DRAWING NUMBER CON-49 SHEET 1





1

2

3

4

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3

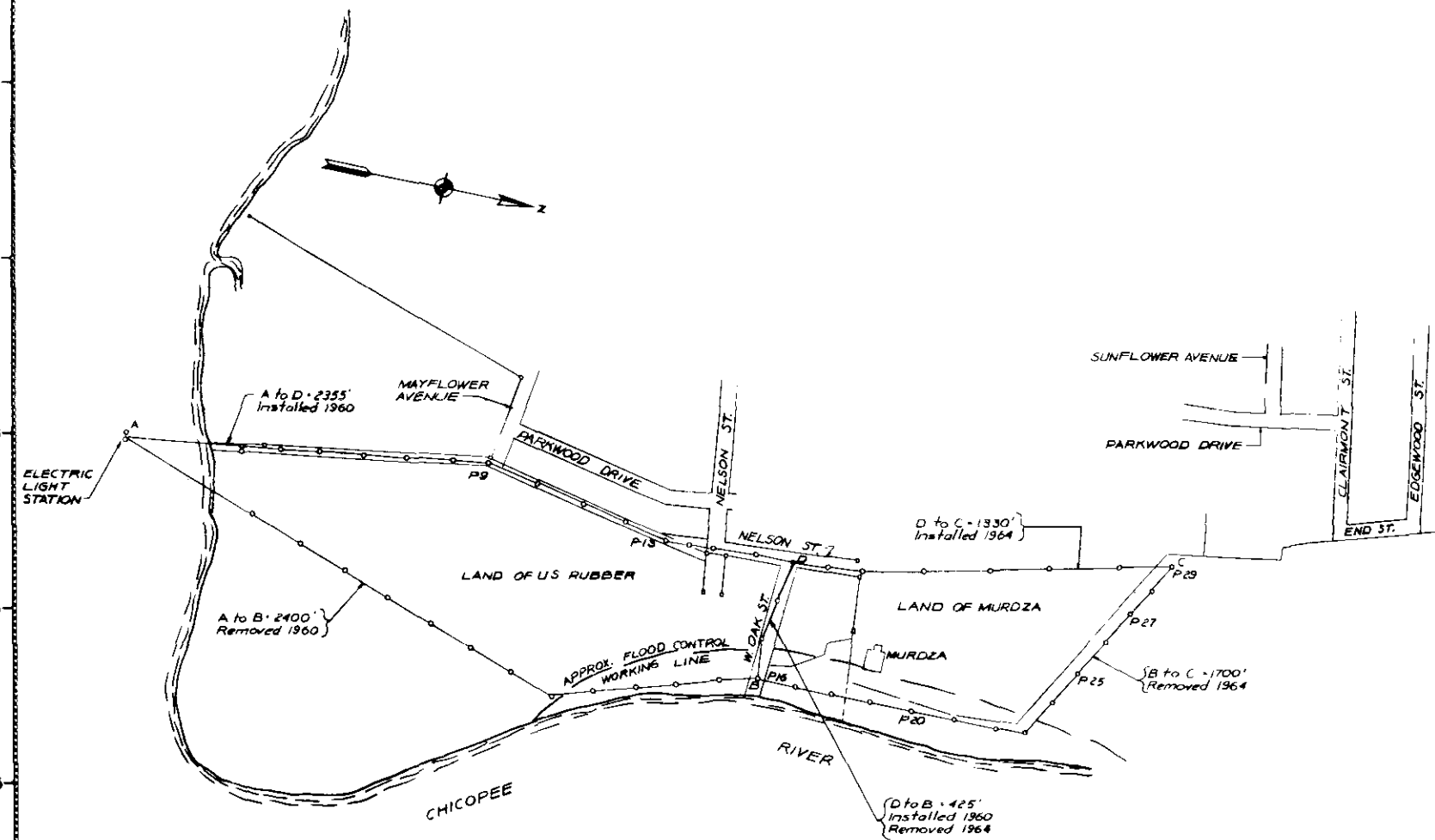
4

5

6

7

8



## PLAN

SCALE 1" = 200'

LEGEND		
NEW	EXISTING	DESCRIPTION
	o	Pole
	—	Electric line
	—	Existing lines to remain in place
	—	Existing lines to be relocated or abandoned
	—	Relocated line



DESIGN	DATE	REVISION	BY
U.S. ARMY ENGINEER DIVISION, NEW ORLEANS CORPS OF ENGINEERS CHICOPPEE RIVER FLOOD CONTROL CHICOPPEE FALLS ELECTRIC RELOCATIONS CITY OF CHICOPPEE CHICOPPEE RIVER MASSACHUSETTS DATE MAY 1965 SCALE 1" = 200' CON - 29 SHEET 1			

PLATE NO E-62